AUTOMOTIVE INDUSTRIES

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No 1935 National Shows?

NACC Is Considering Simultaneous Dealer Shows in About 100 Cities

DETROIT — Abandonment of the 1935 national automobile shows in New York and Chicago in favor of exhibitions staged by local dealer organizations in perhaps 100 cities, and held during a single week at the beginning of next year's selling season, is being considered by the National Automobile Chamber of Commerce. A seven-day period in the latter half of February, to be known as "Automobile Week," is favored by the Chamber as the most desirable time.

Although the Chamber states that whether the plan will be put into effect "will depend upon the availability of proper buildings during the period," it is believed in some quarters here that the chances are better than even that the national shows will not be held in 1935 although they may be revived in 1936.

The Chamber announcement continues that: "It has been found that the best results come from dealers' shows at the beginning of the selling season when the public is naturally more interested in new models. This might mean a later introduction of models which heretofore have been first presented to the public at the New York national exhibition, beginning early in January, and which would be supplanted by the dealers' shows."

Fear of labor troubles also is regarded as a direct factor in bringing about consideration of at least temporary abandonment of the national shows which the N.A.C.C. has sponsored for years. Certainly the industry doesn't want a repetition of this year's experience when knowledge of impending simultaneous introductions of new models at New York enabled labor unions to hamstring the car makers with last fall's tool and die strikes. As Automotive Industries has reported previously, the plan of announcing new models simultaneously at the end of the year, appears to be losing favor. In view of the labor situation, the tendency in the industry seems to be toward spreading announcements through the year to stabilize employment, despite the

(*Turn to page* 638, *please*)

"N.A.C.C. Is Considering"

Charles D. Hastings, Hupp president and chairman of the Chamber's show committee

Head of Show Managers Assn. for N.A.C.C. Plan

Buckman Urges Show Dates Be Geared to Announcement of Industry's 1935 Models

CLEVELAND—"A fine idea and I am confident that local show managers will welcome an opportunity to cooperate with the N.A.C.C.," Herbert Buckman, vice-president and acting head of the International Association of Automobile Show and Association Managers, said when

(*Turn to page* 636, *please*)

"A Fine Idea"

Herbert Buckman, Cleveland show manager and acting head of the International Association of Automobile Show and Association Managers

April Production Nears '30 Record

Passenger Car Output 917,366 Since Jan. 1

WASHINGTON — Production of passenger cars and trucks in the United States and Canada during April was the greatest of any month since May, 1930, and was the largest April since 1930, according to reports released by the Census Bureau. The total for the month amounted to 378,983 cars and trucks as compared with 188,968 a year ago and 350,173 during March of this year. Of the total production 308,263 were passenger cars, an increase of 93 per cent over April, 1933, and 70,720 were trucks, showing the substantial gain of 146 per cent over a year ago.

For the first four months of the year passenger car production amounted to

(*Turn to page* 636, *please*)

Sales Decline May Keep Month's Output at 300,000 Mark; High Priced Class Hit

DETROIT—Last week's upturn in sales failed to hold as the mid-month point was passed and sales once more began to drop off contrary to normal month-end increase. With dealers beginning to show signs of cold feet on stocks, factory shipments also resumed a downward trend with a possibility that production for the month may not pass the 300,000 mark as against last week's estimate of 320,000.

The downturn in sales appeared to be rather general over the country and for virtually all price classes. Hardest hit apparently are the upper price classes due to limitations on trade-in valuations by the dealer code. Some attempt is being made to obtain exemption from this provision, but with little apparent hope of success.

Introduction of lower priced models by Hudson last week and Dodge this week is expected to stimulate factory shipments and sales for these companies, but so far it is too early to tell whether they will have any direct effect on total volume. Similar lower priced editions of standard lines are being considered by other manufacturers if the move is indicated as profitable in the next few weeks.

Buick, now back in production, is concentrating largely on the new "40" with June schedules figured at around 11,000 cars as compared with some 7,000 this month, the low figure, of course, being due to the recent Fisher strike. Hudson shipments stimulated by the lower priced model are running around 500 daily. Officers of the corporation were re-elected at directors meeting this week. At stockholders meeting held earlier Roy D. Chapin announced that Hudson had been operating at a profit since latter part of February.

The N.S.P.A. reports member sales for first quarter this year 36 per cent up from last year on parts, 46 per cent increase in shop tools and 76 per cent in shop equipment.

(*Turn to page* 636, *please*)

Richberg Confirms Steel Code Changes

WASHINGTON—The Darrow Review Board will further augment its report on NRA to the President with a report on the Motor Vehicle Retail Trade Code. Of particular interest to the automotive industry was the Richberg reply to the Darrow report confirming changes in the Steel Code, recently forecast in *Automotive Industries*.

Four important changes, or recommended changes, appear in the NRA summary. They are: first, the place for basing points for price quotations should be at or within a short distance from the actual place of production; second, if some form of transportation, other than rail, is specified by the buyer, then only actual transportation charges should be made; third, recommendations will be made prior to May 31 of policies to be adopted in revising provisions for price filing or price determination in the code, and fourth, the constitution of the Steel Code Authority and administration of the code should be made to conform more closely to general principles of code administration developed through experience.•

Dodge Dealers Showing New Lower-Priced Six

DETROIT—A lower priced edition of the 117 in. wheelbase Dodge 6 is being shown here by dealers. Prices of $650 for the business coupe, $745 for the 4-door and $695 for the 2-door sedan are from $40 to $50 less than for the regular line now called the Deluxe series and compare directly with prices of Dodge 6's before the increase in prices made in March.

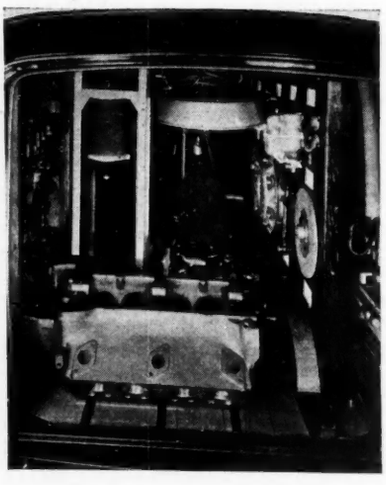
Mechanically specifications correspond closely to those of the Deluxe line, a major difference being that no automatic clutch is available. This is standard at extra cost on the regular line. Major differences between the lines is largely in matters of trim appointments and accessories. Hoods have but one group instead of three groups of horizontal louvers. There is only one wiper and one tail lamp. Coupes have windshield wings instead of ventilating windows. Sedans have no ventilators in the rear quarter windows. Fenders are finished in black.

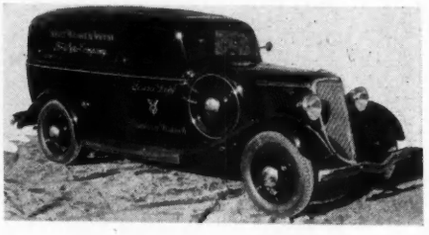
Well-Known Engineers Join Packard's Staff

DETROIT—During the past few months Packard Motor Car Co. engineering department has undergone one of the largest expansions ever seen in a similar period for a major car manufacturer. Approximately 90 new men have been added to the staff it is reported, and the list includes such well-known names as: E. H. Smith, formerly assistant chief engineer of Pontiac; Erwin L. Bare, who came from Hupmobile and is a well known body engineer; Edwin H. Johnson, who also came from Pontiac, where he had been specializing on cost engineering; Charles M. Lejust, formerly Olds purchasing agent and who is acting in the capacity of contact man between purchasing and engineering departments at Packard; E. A. Weiss, formerly with Willys-Overland and Continental engineering departments.

The addition of these engineers to the Packard staff, of course, is largely the result of Packard's product expansion program including the development of a lower priced automobile for introduction sometime later this year.

A Ford Traveling Service School Truck





Each of the Ford Motor Company's 32 branches has one of these units traveling its territory holding service schools. The sessions are held at night and consist of a series of lectures by trained instructors. The instruction covers Ford repair procedure, the unit exchange plan and the use of modern service equipment

Wolman Board Gives Merit Priority

Issues Layoff Rules Interpreting President's Settlement Principle

by Athel F. Denham
Detroit Editor, Automotive Industries

DETROIT—Recognition of the validity of the much disputed "merit" clause in the automobile manufacturing code from the industry's standpoint is perhaps the outstanding feature of a set of rules issued late last week by the Automobile Labor Board, headed by Dr. Leo Wolman, to govern layoffs and re-hiring of employees.

Furthermore, since the American Federation of Labor has issued a statement endorsing the Board's ruling, it may be said also that the A. F. of L. has recognized the right of automotive manufacturers to accord precedence in retention and rehiring of employees to those men "whose work *in the judgment of the management* is essential to the operation of the plant and production, or who have received special training or have exceptional ability." The quotations are from the Board's rulings.

Representing probably the finest single cooperative effort between labor and management in general, that the automotive industry has ever seen—for the rulings are basically the outcome of agreements reached between labor and employer representatives at Automotive Labor Board sessions—the ability to produce a set of guiding principles governing layoffs and rehiring acceptable to both sides is a tribute to the conciliatory abilities of Dr. Wolman and his associates on the Board.

Furthermore, a highly important point is that nowhere in the rulings does there appear anything relative to the question of proportionate layoffs of "union" or non-union workmen. It is probable, however, that this is covered by a provision of the Board in the rulings that schedules of lay-offs must be prepared by individual manufacturers including lists of cases falling within the "merit" class, which must be made available when desired to the Automotive Labor Board. The last paragraph of the rulings leaves the road open to providing rules on proportionate lay-offs of union and non-union men by stating: "The Board will establish such further rules as experience shall prove to be necessary."

The principles governing lay-offs as set out by the Board, are in the form of a mandatory order interpreting the President's settlement statement which read as follows:

"The industry understands that in reduction or increases of force, such human relationships as married men with families shall come first and then seniority, individual skill and efficient service."

This statement has been subject to varied interpretations on account of the grouping of the factors to govern lay-offs. In the Board's rulings priority of retention at work is arranged as follows:

1. Importance of the employee to functioning of the plant, in the judgment of management.

Dr. Leo Wolman

2. Married men, or who have dependents, hired prior to Sept. 1, 1933, merit *in the judgment of the management* governing priority in this group.

3. Unmarried men hired prior to Sept 1, 1933, merit in the judgment of the management again governing priority in this group.

4. Employees hired since Sept. 1 irrespective of whether they are married or not, with merit again deciding priority of retention for the group.

A further point is that the rulings are applicable to different classifications of work and groups of operations performed in a plant. In other words the application of these rulings governs lay-offs by plant departments rather than by plants as a whole.

See page 661 for statement of the Automobile Labor Board on Lay-Off and Rehiring.

The classification of workers for priority in lay-offs given above, does not follow exactly the President's statement, it should be pointed out. That statement gave priority to men with family responsibilities irrespective of merit or seniority. The Board's ruling, it will be noted, sets one group of workers, those to be aid off first, outside of this consideration. The reason therefore is a desire on the part of both industry and labor to eliminate as far as possible, or reduce the problem of "floating" labor in the industry—labor which comes to automotive centers during production peaks. In this respect it is not expected that the Board's ruling will meet with disapproval in Washington, since the President has indicated his desire for greater stability of employment within industry.

It is to be understood, of course, that the same rules governing layoffs apply equally, and in reverse order to the rehiring of workmen.

The reason for the Board's statement at this time—it is only the second mandatory ruling issued by the Board, the first having prohibited solicitation of workmen for membership in either "company" or "outside" unions during working hours—is that in the last few weeks substantial lay-offs of workers have taken place in various automotive plants, with further lay-offs expected shortly in line with normal seasonal decline in production. It has been felt that labor troubles might arise as a result of such lay-offs if it could not be clearly shown that they followed principles as outlined by the President, and his representatives, the Automotive Labor Board.

Whether or not the rulings govern the parts and equipment as well as vehicle manufacturing industries is still a moot question. The Board was recently given jurisdiction over the former industries as well in questions affecting labor disputes. It would seem obvious therefore that such industries also will be governed by the rulings at least in principle. The Board has not stated whether it expects parts and equipment manufacturers for the automotive industry to prepare similar schedules governing layoffs, and make these available to the Board when desired.

To Hear W-O Receivers Applications for Fees

TOLEDO—Fees for attorneys in the receivership of the Willys-Overland Co., informally got before federal court this week, but Judge George P. Hahn told the various groups to prepare for a hearing on the application and then notify the court.

It was revealed that the fee for Forrest Jeffries, attorney for the receivers, is to be $19,500, of which $2,500 has been paid, and that Brown and Sanger, attorneys for the receivers, have a claim for a $7,500 fee of which $2,500 has been paid.

Tracy, Chapman & Welles, attorneys for bondholders, have not made public their fee.

Industry Wins Tilt in Battle for Uniform Truck Weight Regulations

WASHINGTON, May 22. — After 17 years of effort automotive interests were successful today in having detailed and specific motor truck size and weight provisions incorporated in the Uniform Act Regulating Traffic on Highways. This is one of the model laws which the National Conference on Street and Highway Safety recommends be adopted by all states in the interests of uniformity.

The victory today was won in a heated meeting of the Conference's Committee on Uniform Traffic Laws and Ordinances. The size and weight provisions next come up for consideration at general sessions of the Conference with final action slated for Friday afternoon. Automotive interests expect the Conference to accept the recommendation of the Committee.

The meeting of the Committee was somewhat of a model itself. The contending groups made no attempt to conceal their identities and the contest was frankly and openly between the truck interests and the railroad interests. The final record vote was 19 to 11. The railroad group tried to ring in 6 proxies but the chair ruled them out of order.

The restrictions adopted represent a compromise on the part of truck interests from positions previously maintained, but as they now stand they have the unqualified support of all those most vitally concerned. The supporters include the National Automobile Chamber of Commerce, Society of Automotive Engineers, Association of State Highway Officials, Bureau of Public Roads, American Trucking Associations, Inc., American Petroleum Institute, National Association of Motor Bus Operators, American Automobile Association, National Grange, Farm Bureau Federation, National Industrial Traffic League and National Highway Users Conference.

Unquestionably it was the support of these important associations that determined the issue.

The size and weight provisions include the following:

Maximum gross weight of 8000 lb. per wheel equipped with high pressure pneumatic, solid or cushion tire; 9000 lb. with low pressure pneumatic. (A low pressure pneumatic tire is described as one taking less than 100 lb. pressure. A tire taking 100 lb. or more is a high pressure pneumatic.) Gross weights per axle are 16,000 and 18,000 lb. respectively.

The gross weight of any vehicle shall not exceed either the sum of the allowable axle weights on the gross weight dependent upon length as given in the following table, the lower prevailing:

Length Feet*	Max. Gross Wt. Lb.	Length Feet*	Max. Gross Wt. Lb.
10.....	35,000	26.....	46,200
12.....	36,400	28.....	47,600
14.....	37,800	30.....	49,000
16.....	39,200	32.....	50,400
18.....	40,600	34.....	51,800
20.....	42,000	36.....	53,200
22.....	43,400	38.....	54,600
24.....	44,800	40.....	56,000

The above table is derived from the 700 (L^2+40) formula adopted by the American Association of State Highway Officials for protecting bridges from excessive loads.

Maximum width is 96 in. with six additional in. granted for pneumatic change-overs. In the latter cases, however, the body width must not exceed 96 in.

Maximum height, 12 ft. 6 in.

Maximum overall length of single vehicle, 35 ft. A tractor and semi-trailer is considered as one vehicle. No combination shall exceed two units and the combination overall length is held to 45 ft.

A performance standard is stipulated in a provision calling for adequate motive power. Two suggested measurements are: 1 cu. in. of cylinder displacement for each 100 lb. of gross weights of vehicle and load; or a 20 m.p.h. speed up a 3 per cent grade, or such other speed as may be considered appropriate.

Motor vehicle commissioners shall register vehicles on a basis of gross weights which must not be exceeded.

*Between centers of first and last axle.

D. C. Supreme Court Upholds Government Right to Reject Bid of Ford Dealer

WASHINGTON, May 24—The District of Columbia Supreme Court today upheld the right of the government to reject the bid of the Northwest Motor Co., Bethesda, Md., a Ford dealer, to supply cars and trucks to governmental departments, even though this concern, or any other Ford dealer, may be the lowest responsible bidder.

The Northwest Co., through its president, R. P. Sabine, secured a temporary injunction last week against the Departments of Agriculture and Interior, forbidding these divisions to throw out the Northwest bid because the Ford company had not signed an NRA code.

The War Department has acted independently and rejected the same dealer's bids on 50 ambulances, even though they were the lowest submitted. The contract was awarded to the Chevrolet Motor Co., whose bid was $1,066.31 each against the Ford bid of $900.22 each. All bids were F.O.B. the factory.

The suit to prevent rejection of the bids as a result of rulings made by Comptroller General McCarl is being prosecuted by the Northwest Motor Co. of Bethesda, Md., headed by R. P. Sabine. It has been announced that this suit will be carried to the United States Supreme Court if necessary. The government contention, backing the McCarl rulings, is that it can reject the bids, even though they be the lowest from responsible bidders, because Ford has not submitted certificates of compliance.

Because of the government's "crack down" policy on Ford the War Department took a loss of $8,305.50. The court proceedings in this instance are of particular interest inasmuch as the War Department soon will re-advertise for bids on 7,000 trucks. These bids were advertised once before but were withdrawn when charges of irregularities were made, creating in Congress such a stir that an investigation resulted. Another fact of interest developing out of the present situation, besides the huge sum of money involved, is the even more important point of the principle involved. The present indications are that the Sabine suit will prove to be the best test yet made of NRA and its authority to penalize industry for not toeing the mark in just the manner NRA thinks it should be toed.

In the present suit there is no charge made by the government that Mr. Ford is not complying with the code, but rather that he has not signed any code, and therefore cannot be given the required certificate of compliance. The test also involves the question of whether bidders on governmnt business must certify to all materials going into supplies offered the government being manufactured under NRA codes, obviously a difficult task.

Sets New Record

Barney Stapert, a world's champion speed typist, typed 131 words a minute in an Airflow DeSoto Sedan traveling 82 miles an hour.

2000 Fisher Workers Organize Themselves

Plant No. 1 Protective Association Has Legal Status, Can Negotiate

FLINT—"Fisher Body Employees' Protective Association" has been organized by employees of the Fisher No. 1 plant in Flint, superseding the Works Council. The new organization differs from the old Works Council mainly in that members must sign application cards, providing a definite record of membership—and thereby providing the organization with legal status in the negotiating of labor disputes, particularly before the Automotive Labor Board. Under the President's settlement of the automobile strike, unions were required to identify their membership for the purpose of collective bargaining.

A. W. Murphy, secretary of the association, says the organization already has on hand applications from more than 2000 of the 5000 employees of the Fisher No. 1 plant, although the cards were mailed out only a week or ten days ago. Financing of the association is through an athletic fund, dances, etc., there being no initiation fee or membership dues. Welfare work and legal advice to members (outside of actual court representation) are functions of the new organization.

A major change in the constitution of the new association as compared with that of the Works Council is that the association can call into its meetings at any time any employee of the plant, including foremen, superintendents, etc. Officers are the same as for the Works Council, their term of office having been extended to Jan. 1, 1935. It is reported that employees in other Fisher plants are considering establishment of organizations similar to the new association in Flint.

MEWA Summer Conference At Chicago June 14-16

CHICAGO—The third annual M. E. W. A. summer conference of Regional Association Representatives will be held in this city June 14 to 16. Issues of paramount importance to the automotive jobbing trade will be discussed in detail.

Principal among the subjects upon which decisions will be made are:—manufacturing code provisions as they relate to jobber distribution; ways and means by which jobbers may be compensated for added costs of doing business; study of relation of volume item sales to gross margin; importance of the independent filling-station market as a factor in increased volume; distribution of tires and tubes under NRA codes and development of increased opportunities for jobbers resulting from them; important aspects of machine shop operations on which M. E. W. A. is working in conjunction with A. E. R. A.; distribution of parts with consideration of ways and means of increasing turnover; operation of branch establishments; provisions of the Wholesale Automotive Trade Code, extensions and proposed amendments; enhanced importance of trade associations under NRA.

New Terraplane Challenger Sedan at $610

New Terraplane Challenger sedan priced at $635. Prior to the April price increases, the comparable model in the standard line listed at $650. The present price of the "standard" sedan is $685. The new Challenger models have somewhat less chromium plating than the standard series; they do not have the screen back of the radiator grille, nor do they have the larger generator for radio equipment. Floor mats, upholstery, and instrument panel finish also are different. The Challenger series is offered in four body styles.

Diesel Train to Replace "Flying Yankee" on B & M

BOSTON—A contract for a stainless steel, stream-lined, Diesel-powered train has been awarded the Winton Engine Co., Cleveland, and the Edward G. Budd Manufacturing Co., Philadelphia, by the Boston and Maine Railroad. The train will do 100 m.p.h. and will be operated between Boston and Bangor, Maine, a distance of 250 miles, replacing the "Flying Yankee." It will consist of three cars with a Winton two-cycle, 670 horsepower Diesel engine in the forward car.

Report Auto-Lite Seeks Owen-Dyneto

TOLEDO—Electric Auto-Lite Co. is understood to be negotiating for purchase of the Owen-Dyneto Co., of Syracuse, N. Y., manufacturers of starting and lighting equipment for automotive trade.

NSPA 10 Years Old

DETROIT — The National Standard Parts Association completed 10 years of service to the automotive maintenance industry on May 24.

Chevrolet to Establish Retail Training Courses

DETROIT—Chevrolet production having caught up with demand, General Sales Manager Holler is launching an intensive retail sales program. Among other features, the program involves reorganization of the central office sales promotion department, appointment of several new committees with retail functions, establishment of training courses for retail personnel, development of wholesale and retail honor societies, and publication of *The All-American* as official wholesale organ.

The new publication is edited exclusively for the company's wholesale organization and will "glorify the achievement of Chevrolet's great wholesale organization both in the central office and throughout the United States."

The May-June schedule of activities in the sales program include Dealers' Advertising Conference, Detroit, May 22-23; Sales Managers' Retail Dinner Meetings in 41 zones, May 25; Retail Salesmen's Mass Meetings, June 1; National Retail Sales Advisory Committee, Detroit, June 6; Dealer Retail Meetings, June 9-23; Sales Managers' Retail Dinner Meetings, June 29.

W. J. Bailey Heads Club

TOLEDO—W. J. Bailey, director of traffic for the Electric Auto-Lite Co., and associated interests, has been named president of the Toledo Transportation Club. Bailey served as traffic manager for Chevrolet at Flint in 1918 and two years later was transferred to New York where he became director of traffic for Durant Motors in 1921.

May Estimated at 300,000

(*Continued from page* 632)

Retail Chevrolet sales in the first ten days of May amounted to 24,226 against 18,600 in the same period last year. For the year to May 10 retail sales totaled 305,257 as contrasted with 202,738 in 1933.

Hudson production to May 13 totaled 54,110 units as against 13,278 last year.

During the week ending May 12, 7675 Plymouth cars were sold at retail by dealers which was an increase of 8 per cent over the previous week and 41.1 per cent greater than the same week of last year, setting a new all-time high for May, according to a factory announcement. Shipments during the week totaled 10,469 units, which was 38.7 per cent greater than the same week of 1933.

Last month was the biggest April in the history of Plymouth, with total shipments of 46,014 cars, compared to shipments of 24,843 cars in April, 1933. Plymouth shipments to date this month, continue on the increase, with a total of 23,325 units up to the 15th of this month, an increase of 13 per cent over the first two weeks of April of this year.

Dodge retail sales for the first 19 weeks of 1934 totaled 82,178 passenger cars and trucks as against 37,387 cars and trucks delivered during the like 19 weeks of 1933.

For the week ending May 12, Dodge dealers delivered 4,522 passenger cars and 1,067 trucks—5,589 vehicles in all, compared to 5,122 deliveries made during the preceding week.

Reo Motor Car Company's total shipments of passenger cars and Speed Wagons during the first 15 days of May are 50 per cent ahead of those for the first half of April and Reo passenger car shipments during the period have amounted to three and one-half times the passenger car output during a like period last month.

Approves N.A.C.C. Plan

(*Continued from page* 631)

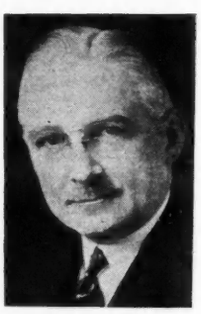
asked by Automotive Industries for his views on the Chamber's announcement that it was considering abandonment of the New York and Chicago National Shows in favor of dealer operated shows held simultaneously in perhaps 100 cities.

Mr. Buckman has been manager of the local automobile show for many years and the association, of which he is the acting head, includes in its membership the managers of local shows in most of the nation's major cities.

In his opinion, however, whether the proposed simultaneous exhibitions should be held in the latter part of February as suggested by the Chamber, hinges to a large extent on whether the manufacturers will withhold new model announcements until that time. He regards it as important to the success of the shows from an attendance standpoint that there should be no material lag between new model introductions and the exhibition of the new models in the shows. Moreover, he is inclined to believe that some week in January would be preferable to a February date, since that is a normally slack selling period and the show activity provides an opportunity for keeping salesmen profitably occupied.

In New G M Posts

Reading from left to right—B. D. Kunkle, assistant to vice-president C. E. Wilsen; F. L. Burke, president of Guide Lamp, and F. H. Prescott, president of Delco Products



H. W. Jackson who has been named vice-president in charge of manufacturing of the Bearings Co. of America

General Motors Acceptance Corp.

NEW YORK—The General Motors Acceptance Corp. report for the year ended December 31, 1933, has been issued showing a net profit of **$8,055,414,** an increase of approximately $2,000,000 over the previous year. The report also announced the appointment of N. C. Dezendorf as vice-president.

The principal items of the report follow:

	1933	1932
Gross business	$517,192,442	$412,527,089
Net income	8,055,414	6,266,103
Dividends	6,000,000	6,000,000
	As of Dec. 31	
Notes and bills receivable, U. S. and Canada	151,318,823	122,216,308
Cash in banks and on hand	29,922,955	43,281,372
Funded debt	13,919,000	49,161,000
	1933 Volume	
Wholesale	241,396,578	167,856,930
Retail	275,795,864	244,670,159
Total	$517,192,422	$412,527,089

April Output 378,983

(*Continued from page* 631)

917,366 as compared with 471,883 for the first four months of 1933, while truck production for the same period amounted to 223,727 as compared with 85,350 units. Total motor vehicles show a gain of 105 per cent over first four months of 1933.

The Census Bureau figures follow:

	April, 1934	March, 1934	April, 1933	Per Cent Increase, 1934 over 1933
Cars	308,263	290,423	160,307	92.6
Trucks	70,720	59,750	28,661	146.0
Total	378,983	243,955	188,968	101.0

Four Months Compared

	1934	1933	Per Cent Increase
Cars	917,366	471,883	94.2
Trucks	223,727	85,350	162.0
Total	1,141,093	557,233	105.0

Automotive Chemical Code Hearing June 4

WASHINGTON—The National Recovery Administration will hold a public hearing on a code of fair competition submitted by the Automotive Chemical Specialties Manufacturers Association, claiming to represent 66 2/3 per cent of the members and 86 per cent of the volume of that industry. The hearing will be conducted by Deputy Administrator Joseph F. Battley, beginning at 10 a. m. Monday, June 4, 1934, in the Green Room of the Raleigh Hotel, Washington, D. C.

City Auto Stamping Co.

TOLEDO—City Auto Stamping Co. reports a net loss of $84,560 for the year ended Dec. 31, 1933, against a net loss of $98,247 for the previous year. The report showed current assets of $590,161 and liabilities of $656,635 for the same date.

Current assets included cash, $77,669; accounts receivable, $302,482, and cash value of life insurance, $48,659.

Would Bar Illegal Speed Claim Ads

Vehicle Administrators Propose Action In Hope Of Reducing Fatalities

NEW YORK—Motor vehicle administrators representing 9 eastern states and two provinces of Canada met in New York May 17 and 18 to complete the organization of the former Eastern Conference of Motor-Vehicle Administrators into District No. 1 of the American Association of Motor Vehicle Administrators, and to consider several matters relating to safe operation of vehicles on the highway.

J. P. Bickel, motor vehicle commissioner for the Province of Ontario was named chairman of District No. 1, which includes 11 eastern states and two eastern provinces of Canada. Mr. Bickel held the same position in the former Eastern Conference.

The conference went on record as being in favor of recommending the principle to the legislatures of the several states represented; that the advertising of automobile speeds greater than legal and safe speeds be made illegal.

It is understood that the somewhat drastic wording of this resolution was the result of feeling among several administrators that previous promises of automobile manufacturers not to emphasize speed in advertising had not been kept. It was pointed out at the conference that automobile accident records indicate a possible fatality list of 36,000 before the year is ended and that a lot of these fatalities will be a result of excessive speed on the highways.

An executive session of the delegates discussed the question of permitting cars registered in one state to be used in another state without a second license. Following the executive session an informal agreement was reached between Commissioner Charles A. Harnett of New York, and Colonel Michael A. Connor, the Connecticut commissioner to avert a threatened "license war" between the two states. In another resolution the delegates to the conference urged automobile, oil and tire companies to cooperate in promoting safety through use of a reasonable but consistent amount of their time in radio programs and of their space in newspaper advertisements, posters and other media.

The American Association of Motor Vehicle Administrators of which the former Eastern Conference has become an integral part as District No. 1 was organized in Chicago last September. E. Austin Baughman, Motor Vehicle Commissioner for the state of Maryland was elected president of the American Association which includes motor vehicle administrators from the Canadian provinces. Four district organizations are to be included in the American Association. District No. 3 comprising the middle western states was organized in Des Moines last November. District No. 2 comprising the southern states was organized in Atlanta in April. District No. 4 which includes the far western states is to be organized some time in June at Salt Lake City, according to present plans.

Organization of the American Association of Motor Vehicle Administrators with its subdivision into closely associated districts, gives the motor vehicle authorities in the United States and Canada a greatly increased sphere for united action, and for practical purposes increases the speed with which uniform decisions may be put into effect.

Michigan Honors Olds

LANSING—The State of Michigan, through Secretary of State F. D. Fitzgerald, presented R. E. Olds with license tags No. 1886 for his new coupe. The tag number corresponds with the year in which the pioneer automobile builder turned out his first car.

Chevrolet's National Retail Advisory Committee holds first meeting. William E. Holler, general sales manager, seated directly in center at end of table, presided. On Mr. Holler's left is Felix Doran, Jr., and E. W. Rimper sits at the right

Guards Called To Quell Riot

Auto-Lite Strikers Mob Plant Imprisoning 1600 Workers and Officials

TOLEDO, May 23—Strikers and Communist sympathizers formed an ugly mob outside the Electric Auto-Lite plant here today, and after a day of sporadic disorders broke into violent rioting, doing more than $100,000 damage to the plant and imprisoning the 1,600 workers all night.

Eight infantry companies and three machine gun companies of the Ohio National Guard were ordered mobilized and dispatched to Toledo. The Militia drove strikers and sympathizers away from plant at point of bayonets. Auto-Lite officials have indicated willingness to appear before the Wolman Board for arbitration of the disputes.

Efforts at mediation were made by three Federal Government agents—two of whom were trapped in the plant.

Company officials agreed to submit all issues to the Automobile Labor Board in Detroit unconditionally, but the strikers sent word that they want the plant closed down pending negotiations, a 10 per cent wage increase, recognition of their union and no discrimination against strikers.

A score or more of casualties to police, deputies, strikers and others followed the hurling of bricks through windows of the plant, burning of four automobiles, attempts to batter in doors and the repulse of such attacks with tear gas bombs. Officials and workers inside were deputized to give them authority for any kind of self-protective measures.

At times it was estimated there were 7,500 in the mob, including many curious on-lookers. One telephone operator in the plant was shot through the arm, but stuck to her post. As darkness fell, shots took the place of brickbats in the attack on the plant. Several fires were started. It was expected to be under control by daybreak with arrival of the troops.

England Joins Ohio Rubber

WILLOUGHBY, OHIO — The Ohio Rubber Company announces the appointment of W. E. England as chief engineer. Mr. England was formerly chief engineer of F. B. Stearns Company (Stearns-Knight) for over nine years and more recently head of the experimental department of The Auburn Automobile Company.

No 1935 National Shows

(*Continued from page* 631)

fact that uniform new model dates are believed to create more favorable merchandising conditions for the dealer. However, the possibility exists that if the New York Show should be held by the N.A.C.C., the attendant publicity values might lead many manufacturers to time their new model announcements to the opening of that show.

After consideration by the Show Committee, the question of abandoning the shows in 1934 apparently was referred by the N.A.C.C. board of directors to the Executive Committee which is composed of Alvan Macauley, chairman, Walter P. Chrysler, Alfred P. Sloan, Jr., and Roy D. Chapin. The Chamber statement does not indicate that this Committee has reached any definite decision and a good deal may depend on dealer reaction to the proposal.

From the standpoint of the dealer organizations which will have to shoulder the financial responsibility of the local shows, the date question and its relation to new model announcements is an important one. If the announcements are not synchronized with the show week but instead are strung out over the months preceding it, dealer show managements may feel that gate recepits will be affected adversely thereby. The Chamber statement suggests that new model announcements may be deferred to synchronize with the show week, but as has been pointed out, other forces are working to scatter new model introductions, despite the advantages from the dealer's standpoint of bringing out all new models at about the same date and, from the show standpoint, of timing that date to the proposed show week.

What dealer reaction to the proposal will be, can only be guessed at this stage, but there is no reason to doubt that the basic idea will meet with the approval of the trade. However, first reactions suggest that approximate synchronization of new model introductions with the proposed show week would spur their enthusiasm for the plan considerably. Since uniform announcements are exactly what some car makers wish to avoid, it is conceivable that this issue may assume considerable importance. In that case a decision might have to be made as to whether the promotional values of the national shows were important enough to continue them at the risk of labor troubles which might develop if union leaders got the idea that the holding of the shows would result in simultaneous introductions of new models.

It is known that considerable difference of opinion exists among automobile manufacturers on the show question, the division being somewhat along the lines of the major producers as against the independents, the latter generally being in favor of holding the N.A.C.C. show as formerly. It was impossible to reach Mr. Macauley, chairman of N.A.C.C. executive committee, on the question. A majority of sales managers contacted professed ignorance as to actual N.A.C.C. plans.

So far as the industry's show program is concerned, New York and Chicago will be most vitally affected as under the proposed plan dealer associations in those cities would have to take over the responsibility of staging the shows. In other cities where locally managed shows have been conducted for years, only a shifting in dates to the week agreed upon by the industry for the simultaneous showing, would be involved.

Concentration of the shows in a single week all over the country would have the advantage, of course, of permitting the industry to put its show program on a national basis, instead of splitting its effort up in order to time its promotion activities to show dates in different areas. This would have obvious advantages. On the other hand, the manufacturers would not be able to provide special displays, such as those that made the 1934 national shows so interesting for so many shows. Inasmuch as these special displays were frequently routed around to local exhibitons in the major cities, these shows would lose something in attractiveness. This difficulty might be avoided at some additional expense, by building enough copies of such special displays to take care of the big cities.

Turning from some of the economic aspects of the proposal, there are rumblings of dissatisfaction with the plan among some of the industry's epicures over the gastronomic consequences of the move. They are particularly concerned over the fate of the annual N.A.C.C. banquet which General Manager Al Reeves has made the outstanding event of its kind in the country and which many regard as the high spot of New York Show week.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

There was a noticeable slackening in general business activity last week, which is attributed to the uncertainty regarding legislation at Washington and unfavorable weather, especially in the grain belt. Retail business declined, while wholesale trade made only moderate gains. There was some recession in the major industries; steel operations fell off for the first time in several weeks; and activity in the automobile industry and the petroleum refineries was curtailed.

Car Loadings Off

Railway freight loadings during the week ended May 12 totaled 601,739 cars, which marks a decrease of 2,466 cars below those during the preceding week, an increase of 66,933 cars above those a year ago, and an increase of 84,479 cars above those two years ago.

Electric Output Jumps

Production of electricity by the electric light and power industry in the United States during the week ended May 12 was 11.9 per cent above that in the corresponding week last year.

Construction Awards Drop

Construction contracts awarded in 37 eastern States during April, according to the F. W. Dodge Corporation, amounted to $131,413,800, as against $178,345,800 in the preceding month and $56,573,000 in the corresponding month last year.

Lumber Production Down

New business booked at the lumber mills during the week ended May 12 was the smallest for any week, with one exception, since last February. Production was below the levels in the four weeks preceding, and shipments were smaller than for any of the seven weeks preceding.

Crude Oil Output Up

Average daily crude oil production for the week ended May 12 amounted to 2,522,950 barrels, as against 2,429,500 barrels for the preceding week, and 2,733,850 barrels for a year ago.

Coal Steady

Production of bituminous coal during the week ended May 5 amounted to 6,330,000 tons, as against 6,340,000 tons during the preceding week and 4,810,000 tons in the corresponding period last year.

Detroit Opposed As Basing Point

Report Steel Men Balk At Price Concession In Proposed Code Revision

NEW YORK, May 24—Strenuous opposition to the proposed inclusion of Detroit as a basing point for sheets, bars and strips in a revision of the Steel Code, which expires May 31, has developed among the rolling mills of the Shenango and Mahoning valleys, and numerous steel producers in other districts. This opposition is a confirmation of *Automotive Industries'* forecast last week that the automobile capitol would be made a basing point and that quantity price differentials also would be included in the rewritten code. Steel men who oppose the proposed changes say that such action would undo much of the good already accomplished by the code.

There is also talk that the former system of price concessions to tonnage buyers, which was done away with by the code, will be restored and this proposal also comes in for sharp dissent from many of the steel producers. Whatever opinion individual steel buyers and sellers may entertain on these proposed code changes, certain it is that for the time being they add another element of doubt that tends to restrain market activity.

The American Iron and Steel Institute's statistical report for this week, showing an average rate of 54.2 per cent of ingot capacity in operation, denotes a decline of 4.2 per cent from the previous week and reflects in a large measure a slowing down in the rate at which specifications from automotive consumers are coming through. Some of the finishing mills have let their customers know by what day final specifications must be in hand to make possible shipments by June 30. A $3 per ton advance in the price of cold-finished steel bars is scheduled for next month.

Pig Iron—Automotive foundries are calling for shipments on contracts in more or less of a routine manner. Code prices remain unaltered.

Aluminum—The market for remelted aluminum is fairly active and steady at unchanged price levels.

Copper—Holders of copper stocks have been notified by the Code Authority that they will be entitled to participate in the allocation of sales against stocks, but that they must forthwith file an inventory of their holdings as of April 30 and otherwise comply with the Code. "Blue Eagle" copper continues to be quoted at 8½ cents, delivered Connecticut Valley point, with the "outside" market quoted at 8¾ at 8½ cents.

Tin—Details of the Buffer Pool, established by the International Tin Committee, for the purpose of eliminating too sharp market fluctuations, are beginning to trickle through. Spot Straits tin was quoted at the beginning of the week at 53⅛ cents, a shade lower than the close of the preceding week.

Lead—Price reductions late last week by the leading interest served to bring out considerable latent demand, storage battery manufacturers figuring prominently among the buyers. The New York contract price now is 4 cents.

Zinc—Dull and easy.

M. M. Gilman

Macauley Names Gilman Packard General Manager

DETROIT—M. M. Gilman, vice-president in charge of distribution of the Packard Motor Car Co., has been elected vice-president and general manager of the same organization. The announcement of Mr. Gilman's promotion was made by Alvan Macauley, president, following a recent meeting of the Packard board.

Mr. Macauley remains president, but relinquishes his managerial duties to Mr. Gilman. Mr. Gilman joined the Packard organization in 1918 as a truck salesman in Brooklyn, N. Y. Later he was appointed truck sales manager for New York and when the company discontinued the truck line Mr. Gilman was named general accessories manager and later was promoted to wholesale manager in the New York territory. Mr. Gilman's next promotion was to vice-president in charge of sales of the New York company and two years ago he was called to the home office as vice-president in charge of distribution.

Diamond Chain Co. Plans Producing Standard Sizes

INDIANAPOLIS—After having made roller chains of stainless steel on special order for several years, the Diamond Chain and Manufacturing Co. has now gone into regular production of the most commonly used sizes of these chains in the stainless material and will be able to make immediate shipments of them.

Jonathan Orville Whitaker

CHICAGO—Jonathan Orville Whitaker, president of the Whitaker Manufacturing Company, makers of automobile parts and machinery, died suddenly at the Chicago Athletic Club here, May 12, from heart disease. He was 74 years old.

MEMA to Make Survey Of Warehouse Problem

NEW YORK—Mason T. Rodgers, president of M.E.M.A., has begun a special survey on the place in the present and future picture of warehouses in distribution. The survey is being conducted as an activity of the M.E.M.A. sales managers group committee.

Before attempting to develop any particular phases of the warehousing problem, or arriving at any definite conclusions, a broad study of the entire warehousing situation will be made. Sales managers of all M.E.M.A. members are being asked to submit to the association their own views, favorable and unfavorable, on any or all sides of the subject in which they are interested.

It is believed by the M.E.M.A. that an analysis of the replies received will indicate the direction along which various parts of the survey can then proceed;

C. T. Scannell New Buick Manufacturing Manager

FLINT—Charles T. Scannell has been appointed general manufacturing manager of Buick Motor Company by Harlow H. Curtice, Buick president and general manager. Mr. Scannell takes the vacancy caused by the resignation of George T. Christopher.

When the Weston-Mott Company moved its operations to Flint in 1907, Mr. Scannell came here and was placed in charge of the Lathe Department. A short time later he was placed in charge of all the Mott factories which later became part of the Buick, and more than 10 years ago was appointed superintendent and then factory manager of the No. 11 factory, which is the Buick motor plant.

C. T. Scannell

Drivers, Not Mechanical Condition, Held Chief Cause of Automobile Accidents

HARTFORD, CONN.—As has been the case ever since Connecticut started issuing accident statistics, the annual report covering 1933 indicates that if all the motor vehicles on the highways were in perfect mechanical condition, no major reduction in accidents would follow.

Errors of commission and omission on the part of operators were responsible for 76 per cent of the accidents in both 1933 and 1932, which clearly indicates that, if the accident toll is to be reduced, efforts must be directed at drivers. Defective equipment is charged with 3 per cent of the accidents in 1933 as compared with 2.4 per cent in the previous year. In the case of fatal accidents, defects were held responsible for 2.9 per cent last year as compared with 5 per cent in 1932.

During the year state inspectors examined the conditions of 26,142 vehicles and found the following defects: brakes, 2,743; lights, 6,931; markers, 1,809; reflectors, 3,206; windshield wipers, 948; mirrors, 381; weight markings, 250; horn, 510; tires 74; steering gear, 54; mufflers, 7; signal devices, 754; axle, 1.

The need for better lighting for night driving is emphasized again in the reports which shows 48 per cent of the accidents occurred during the night and at dusk. Inasmuch as it is probably true, that considerable portion of total mileage is driven during the night hours, the need for continued improvement of lighting appears evident.

Relatively more commercial vehicles were involved in accidents than passenger cars. The difference probably is not significant, however, as the ratio of passenger cars in accidents to total passenger car registrations was 6.4 per cent as compared with 7.2 for commercial vehicles.

Little Likelihood Labor Bills Will Pass Congress

WASHINGTON—Despite administration support for a revised Wagner Labor Disputes Bill, now known as the National Labor Bill, its chances of passage at this session appear to be steadily waning.

The Wagner-Lewis Unemployment Reserve and the Connery 30-Hour-Week bills also appear to be definitely in the discard, although an effort is being made to force a House vote on the latter measure. It is understood that the administration has been advised that passage of these bills is virtually impossible if Congress is to adjourn early in June.

Truck Industry Objects To Lowered Rail Rates

WASHINGTON—The trucking industry, through its national code authority, has filed with the Interstate Commerce Commission a brief of exceptions to the report proposed by O. L. Mohundro, examiner, recommending that rail carriers operating in Official Territory be permitted to establish commodity rates "to meet truck competition," even if the result is to make the sum of short-haul rates between two points less than the through tariff. The report recommends that such rail carriers be permited to reduce rates as much as 40 per cent below existing levels.

According to the code authority's brief, filed by Ted V. Rodgers, national code chairman, Harold S. Shertz, and Edward S. Brashears, general counsel for the code authority, the real purpose of the application is "to eliminate the service of truck transportation." The brief points out that should such "relief" be granted it will prove uneconomic and harmful to the carriers themselves.

William Fairhurst, named Spicer Vice President

Big Improvement Noted In Sterling's Business

MILWAUKEE—Sterling Motor Truck Co. reports the most active business in the last half of April of any two weeks' period since 1930, and May orders show improvement. The largest order booked is for ten Diesel-engine heavy duty tractor-type trucks for Pacific Freight Lines, Los Angeles. Eighteen individual orders have been received from all parts of the country for Sterling's new type of dump truck for coal handling and other similar purposes.

SKF Executive Offices Moved to Philadelphia

PHILADELPHIA — To facilitate service and engineering assistance the executive, sales, engineering, research, and production departments of the SKF industries have been consolidated at the Philadelphia plant.

For twenty years the executive offices of the organization have been maintained at New York City.

CALENDAR OF COMING EVENTS

SHOWS

American Transit Assoc., Cleveland, Ohio ..... Sept. 22-27

Cleveland (Automotive Service Industries) ..... Nov. 19-23

MEETINGS

S.A.E. Summer Meeting, Saranac Lake, N. Y. ..... June 17-22

American Society for Testing Materials, Atlantic City, N. J. ..... June 25-29

American Chemical Society, Cleveland, Ohio ..... Sept. 10-14

American Welding Society, New York City ..... Oct. 1-5

RACES

Indianapolis ..... May 30

ANNUAL MEETINGS

Natl. Automobile Chamber of Commerce, New York, N. Y. ..... June 7

American Electro Platers Soc., Detroit ..... June 11-14

Natl. Assoc. of Motor Bus Operators, Cleveland ..... Sept. 21-22

Natl. Safety Council, Cleveland, O., Oct. 1-5

CONVENTIONS

American Society for Metals, New York City ..... Oct. 1-5

American Transit Assoc., Cleveland ..... Sept. 24-27

International Foundry Congress, Philadelphia ..... Oct. 22-26

American Foundrymen's Assoc., Philadelphia ..... Oct. 22-26

National Foreign Trade Council, New York ..... Oct. 31-Nov. 2

EXPOSITION

Natl. Exposition of Power & Mechanical Engineering (Biennial) New York, N. Y. ..... Dec. 3-8

Fisher No. 1 Plant Pickets

Strikers returned to work Monday under agreement which submitted differences to conference with management through help of Automobile Labor Board

Courtesy, Flint Daily Journal

Employment Level Up 6% In April

Automotive Industry In Leading Position Over 16 Major Groups

WASHINGTON—The automotive industry made a gain of 6 per cent in employment during April when compared with March of this year and a gain of 129.3 per cent over the employment level of April 1933, according to the Bureau of Statistics, Department of Labor. April payrolls rose 9.4 per cent above the previous month and 213.1 per cent over the corresponding month one year ago. This is one of the largest gains recorded by 16 industrial groups reporting to the department. These gains in automotive employment and payrolls compare with an estimated increase of 3 per cent in April production over March.

Taking the period 1923-25 to equal 100, the employment index in the automobile industry for April of the present year was 114.9 while the payroll index was 107.4. The most pronounced percentage gain in employment was in the aircraft industry, which reflected an increase of 18.3 per cent over March.

Automobiles, steel and foundry products reflected the most marked gains in April over March in employment, Secretary of Labor Frances Perkins said. The general employment index rose from 80.8 in March to 82.3 in April while the general payroll index increased from 64.8 to 67.3. The gains in factory employment and payrolls were confined almost entirely to the durable goods groups. The only decreases in employment in the 16 industrial groups surveyed were in the anthracite and bituminous coal mining industries. These declines affected approximately 39,000 workers.

"Based upon the rise of the indexes of the Bureau of Labor Statistics, it is estimated that more than 224,000 workers were returned to employment during April in the manufacturing and non-manufacturing industries," Miss Perkins said. "The increase in the combined weekly payroll is estimated to have been $7,700,000. In addition to these gains in private industry was an increase of 85,000 workers who found employment on projects financed with public works funds. There was also a gain of nearly 13,000 workers reported by the Interstate Commerce Commission for Class I railroads. Reports on agricultural employment indicate a seasonal increase in that field."

Champion Makes Talkies For Dealer Organization

TOLEDO—Champion Spark Plug Co. has just released two talking pictures for the benefit of its dealer organization. Each film is two reels in length with sound on the film.

Ethyl Corp. Exhibit in GM Building at Chicago

DETROIT—Ethyl Gasoline Corporation will have a display in the General Motors Building at the Century of Progress Exhibition in Chicago. The exhibit will consist principally of a single-cylinder engine mounted in a glass case, which operates continuously but alternately on ordinary gasoline and on the same brand of gasoline blended with ethyl fluid, the change-over from one fuel to the other being effected automatically.

Indicators mounted on a panel above the glass case show how the speed and power of the engine increase and the cooling-water temperature decreases when changing from ordinary to ethyl gasoline. On opposite sides of the engine stand there are photographic screens conveying information as to what ethyl gasoline is and under what names it can be bought in different parts of the country.

Chain Belt Co. Enlarges Detroit Warehouse Stock

MILWAUKEE—The Chain Belt Co. has placed a stock of all types of malleable and steel chains, steel roller chains, chain sprockets, buckets, set collars, pillow blocks and takeups in its Detroit warehouse.

The company's Detroit office has been moved to 5169 Martin Avenue, and is adjacent to the warehouse. C. E. Martin continues in charge.

Financial Trends Among Parts Makers

(31 Companies)

	(1929 = 100)				
	1929	1930	1931	1932	1933
Net Income	100	40	10	Def.	8
Dividends	100	96	65	25	15
Plant and Property Depreciated	100	101	95	78	71
Good Will, Etc.	100	104	107	20	21
Cash and Securities	100	103	92	85	80
Receivables	100	70	56	41	55
Inventories	100	73	61	47	61
Current Assets	100	79	69	58	64
Current Liabilities	100	59	47	34	47
Working Capital	100	85	74	64	69
Funded Debt	100	88	103	75	69
Net Worth	100	97	91	70	68
Net Worth Less Intangibles	100	96	89	75	73
	RATIOS				
Current Ratio	5	7	7	9	7
Per Cent Earned on Net Worth Less Intangibles	21	9	2	Def.	2
Dividends as Per Cent of Net Worth Less Intangibles	11	11	8	4	2
Working Capital as Per Cent of Net Worth Less Intangibles	47	42	39	41	45

For the detailed financial record of these 31 parts companies see page 654.

The Story of the

by P. M. Heldt
Engineering Editor,
Automotive Industries*

IT is too soon to write the obituary of the national automobile shows which the industry has staged for so many years in New York and Chicago. But the N.A.C.C.'s announcement that it is considering abandoning them for 1935 at least in favor of exhibitions staged simultaneously by local dealers in perhaps 100 cities, seems to justify some reminiscing on the history of these displays which have been a unique feature of the of the industry's merchandisinng program for so long a period.

The first national show was held in the old Madison Square Garden, New York, Nov. 3-10, 1900, under the auspices of the now defunct Automobile Club of America. It was not known as a "national" show at the time, because the occasion for distinguishing between national and local shows had not arisen, but it was certainly intended to draw visitors from a large section of the country, and it undoubtedly did so. This show differed from all of the succeeding ones in New York in that the central part of the big hall was fenced off to form a track on which vehicles could be shown in motion. Contests of one kind and another were held on this track afternoon and evening, most of them reserved to vehicles with the same kind of motive power, and toward the end of the week there were competitions between the winners of the preceding events.

About 35 manufacturers of motor vehicles were represented at this first New York show, and about the same number of makers of parts and accessories. There were some 200 vehicles on the stands. The attendance averaged about 6000 per day In addition to the commercial exhibits there was a "loan exhibit" by members of the Automobile Club of America which included quite a number of the earliest motor vehicles built in this country. At a meeting held at the Hoffman House in New York during show week, the National Association of Automobile Manufacturers (N.A.A.M.) was formed—the first industrial organization of the automobile industry.

Chicago's first show was held in March, 1901, under the management of the late Samuel A. Miles, then publisher of *Motor Age*. At that time automobile activities still centered largely in the East, and there were not as many exhibitors at Chicago as there had been at New York the previous November. This first Chicago show was held in the Coliseum, which has remained the main show building for automobile exhibitions in the Windy City ever since. There was a demonstrating track also at the Coliseum, but demonstrating automobiles on an inside track seems to have had its disadvantages, for the representative of *The Horseless Age* wrote in his report: "It must be said that the track manners at this show were not above reproach. To the lack of good track management were due a number of accidents, some of which were quite serious indeed, and a good part of the time of one or two men was required to repair the railing around the track where machines had been lost control of and broken through."

New York's second annual show was held in Madison Square Garden in November 1901. The track was dispensed with, all of the available space being occupied by exhibits, and instead of showing their vehicles in operation inside the building, manufacturers kept demonstrating vehicles in readiness outside. The second Chicago Show was held in the Coliseum in March 1902. A change had taken place in the control of this show in that Sam Miles had allied himself with the Chicago Automobile Club, which gave its sanction to the show and no doubt received a cut of the proceeds. It was at this show that a meeting was held which resulted in the organization of the American Automobile Association, the federation of state automobile associations which later acquired, and has retained up to the present, control of automobile sporting events in this country.

The N.A.A.M. decided shortly after its organization that it would have a share in the conduct of the New York and Chicago shows, which were to be held as national shows; that it would not participate in shows in other cities, and that if such shows were to be held they would have to be supported by the local dealers. This led to the distinction between national and local shows. Arrangements were then made with both the Automobile Club of America and with Sam Miles and the Chicago A. C., and from the latter part of 1902 on the manufacturers sponsored these two national shows.

At these early shows the show management only furnished the floor space and the exhibitors looked after the equipment and decoration of their stands. It need hardly be mentioned that under these conditions the shows as a whole were not nearly as attractive as those of recent years. But automobiles were such a novelty in those years that lavish decorations

The First National Show

New York, 1900 —A demonstrating track encircled the exhibit space

*Mr. Heldt has attended every national automobile show held in New York since their inception in 1900 with one exception.

National Automobile Show

were not required to bring visitors to the show. At the first shows in New York and Chicago only complete cars were exhibited, but after a year or two exhibitors began to prepare polished chassis, sometimes with certain parts sectioned, to enable their stand attendants to better explain the internal mechanism to interested visitors.

The third annual show in New York was held in January instead of in November, and was followed closely by the Chicago show, an arrangement which has been retained to this day.

A break in the ranks of the industry came in 1904 with the litigation over the Selden patent and the organization of the Association of Licensed Automobile Manufacturers (A.L.A.M.). The latter comprised all those members of the N.A.A.M. who had taken out a license under the Selden patent. Early in 1905 the A.L.A.M. stole a march on the N.A.A.M. by securing an exclusive lease on Madison Square Garden for automobile show purposes, before the N.A.A.M. had renewed its lease. This caused considerable excitement among the unlicensed members of the N.A.A.M., with the result that at the Chicago show of that year (which was held under N.A.A.M. auspices) these unlicensed members formed their own independent organization, the American Motor Car Manufacturers Association, with a membership of twenty. The most prominent among them, and the only manufacturing concern still in active operation, was the Ford Motor Co. Alfred Reeves was appointed general manager of the A.M.C.M.A.

During the next five years there were two national shows in New York each year—one "licensed," the other "unlicensed." The A.M.C.M.A. joined with the Automobile Club of America and held its first show in the Sixty-ninth Regiment Armory during the same week in January, 1906, that the licensed show was held in Madison Square Garden. During the following four years the unlicensed show was held in Grand Central Palace while the A.L.A.M. show continued in the Garden. In the meantime the Chicago show was continued under the auspices of the N.A.A.M. and therefore comprised the exhibits of the whole industry, Sam Miles retaining active management.

Another event which affected the history of automobile shows was the first decision in the Selden case, which was rendered in September, 1909. It upheld the patent. This was the beginning of the end of the A.M.C.M.A., many of its members shortly thereafter securing licenses under the patent and joining the A.L.A.M. Nevertheless, the A.M.C.M.A. held its show in New York in January, 1910, which was its last.

The Ford Motor Co., which was the virtual defendant in the Selden suit, carried the case to the Court of Appeals, and this court rendered its decision—declaring the Selden patent valid but not infringed—in January, 1911, while the annual A.L.A.M. show was in progress in Madison Square Garden. This proved the end of the A.L.A.M. which thus did not outlive its rival, the A.M.C.M.A., by very long. Members of the A.L.A.M. immediately reorganized as the Automobile Chamber of Commerce. The N.A.A.M., the original organization of the industry, was still in existence, but now that the division in the industry which had been caused by the Selden patent had come to an end, there was no purpose in keeping it alive any longer, and in April, 1913, the N.A.A.M. was merged with the Automobile Chamber of Commerce under the new title National Automobile Chamber of Comerce, the organization which has conducted the national shows up to this time.

Upon the organization of the National Automobile Chamber of Commerce, Alfred Reeves was appointed its manager, a post he has continued to hold ever since, and Sam Miles was appointed show manager, which position he retained until his death a few years ago.

From that time on there has been one show each year in New York and one in Chicago. The only disturbance in the continuity of these events was due to the war. During the latter part of 1918, while the war was still in progress, the N.A.C.C. decided not to hold any national shows the following Winter. After the Armistice it arranged with the New York and Chicago dealers' associations to hold somewhat belated shows that season. The transfer of show control to the dealers' organizations was intended to be permanent at the time, as is clearly made evident by an editorial in the Jan. 2, 1919, issue of *Automotive Industries* entitled "The Passing of National Shows." But during those early post-war days all plans were subject to frequent change, and a bare month after the closing of these shows the N.A.C.C. decided at a meeting in New York City that it would resume control of national shows the next year, which it did.

All post war national shows were held in Grand Central Palace, New York, and the Coliseum and auxiliary buildings in Chicago.

The Last National Show?

Crowds milling in the exhibits at the 1934 New York Show

Valve Seat Insert Practice Is Nearing Standardization Stage

Widely used in heavy duty engines, passenger car manufacturers are still divided on their desirability

A YEAR ago valve seat inserts were on probation—today they are almost universally used on heavy-duty engines; also on a number of important passenger cars.

Numbered among the passenger-car manufacturers who have adopted inserted valve seats are all Chrysler units, including Dodge and Plymouth; also Ford V-8, Franklin, Marmon 16, Reo and Willys. At this writing, at least, there seems to be some prospect of the participation of other car builders in this trend.

Due to the fundamental importance of the inserted valve seat in modern engine design, we have included in this article a thorough survey of current practice. No attempt has been made to discuss the reasons which lead to the adoption of inserted valve seats, inasmuch as the story is pretty well known to engineers and, furthermore, was covered in the previous survey published in *Automotive Industries*, Feb. 18, 1933.

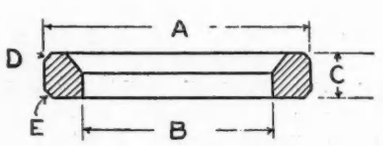


Fig. 1—Typical valve seat insert design with key to dimensions in Table I

For those who may be interested in a more or less critical engineering analysis of the various types of inserts, we suggest a reading of the excellent paper "Valve Seat Inserts," which was read before the Cleveland Section SAE, this season by A. T. Colwell.

For quick reading, Table 1 gives a complete analysis of the chief elements of inserted valve seat practice on a representative group of engines. Incidentally, this analysis reveals some fundamental points of exceeding importance. The first of these is the unmistakable standardization of form and dimensions, exceptions to the rule being the bi-metal types which require a somewhat different treatment. Another trend is the standardization of materials, indicating that the art has reached the point where a certain few analyses are found to give the best results.

Thus we find the choice of materials narrowed to three general types—several forms of alloy cast irons, high-speed tool steels, and bi-metal inserts in several varieties.

Similar simplification has occurred on the manufacturing side of the problem; i.e., method of application in the cylinder block. The method most widely used on heavy-duty equipment consists of the combination of an interference fit produced by pressing in and a rolling operation which aims to keep the seat permanently in place. Several alternate methods of locking the insert are described later.

Another method which already has gained great headway is that of producing an interference fit by chilling the insert either in dry ice or liquid oxygen, varied in several instances by the combination of chilling the insert and heating the block. Chief proponents of the newer methods are the Chrysler group, Ford and General Motors Truck, while several others furnish the inserts optionally.

Before leaving this point, we should like to mention several important manufacturers of heavy-duty engines who, for various reasons, have not been listed in Table 1. In this category are The White Motor Co. and Autocar, whose constructions were described in the previous article; this also applies to International Harvester Co. Another company which has been very active in the development of valve seat inserts is Mack, and we understand it has recently adopted a unique design which is not yet ready for public announcement. Doman-Marks, a prominent newcomer in the industrial engine field, uses, approximately, the

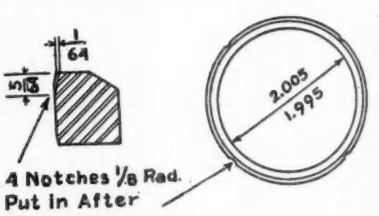


Fig. 2—Notches in periphery serve as additional locking means on certain tool steel and bi-metal seats

by Joseph Geschelin
Engineering Editor, Automotive Industries

Dodge Bros. follows Chrysler practice of shrinking inserts in dry-ice at a temperature of minus 100 deg. F. The ring is driven home with two hammer blows

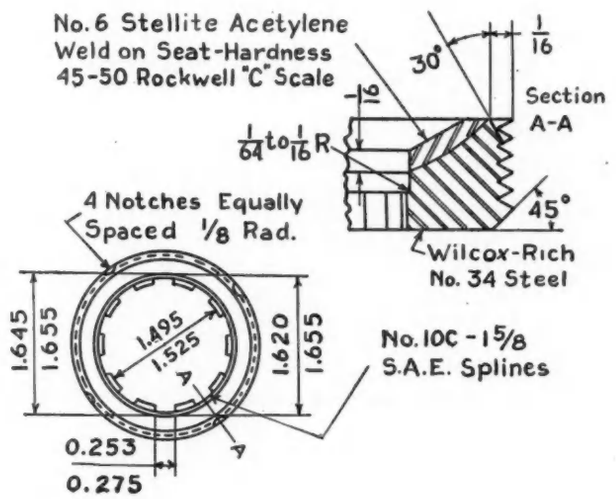


Fig. 3 — Bi-metal insert, faced with No. 6 Stellite is standard on heavy-duty General Motors Truck engines

same construction as the Franklin.

In general, the consensus is that the inserted valve seat is required only for the exhaust valve port and this practice is universal except where aluminum head or aluminum cylinder block material is used. However, a number of the heavy-duty engine builders, such as Waukesha, Hercules and Continental, provide both intake and exhaust inserts where specified by the user. There is also unanimity on the point that the insert need not be considered as replaceable, although the applications in general permit replacement if necessary.

So far as the attributes of the valve seat inserts are concerned, the following few points are probably sufficient:

1. The insert should have the same coefficient of expansion as that of the material into which it is assembled.

2. Insert material should be of such character as to resist scaling, softening or pick-up of the valve under operating conditions.

3. Method of application should be such as to produce a good fit providing metallic contact all around for good heat conductivity.

4. Both the choice of material and method of assembly must produce a construction which will be permanent as to fit, with no tendency to loosen or warp.

5. Smaller interference fits are being advocated. The tendency is decidedly away from heavy press fits which may injure the cylinder block or set up undue initial strain.

Coming now to the matter of standardization of practice, in Table 2 we have shown a list of the principal suppliers of valve seat inserts, it being a notable fact that, with few exceptions, the inserts used in current production are purchased from specialists. In conjunction with this, Table 3 gives the chemical analysis of the proprietary materials on which such data was available.

It is interesting to note that the bi-metal construction developed by Haynes-Stellite, in cooperation with certain engine builders, is at present used by White, General Motors Truck, and Mack, and is also supplied optionally by other engine builders.

Elkonite, a special alloy of tungsten (75 per cent) and copper, is a proprietary material made by P. R. Mallory & Co. used on a number of heavy-duty installations. Several years ago Elkonite inserts made their appearance on the Chrysler Imperial. Very recently Mallory introduced a composite insert design con-

TABLE 1

Analysis of Valve Seat Practice

ENGINE		INSERT DETAILS				INSERT DIMENSIONS					
Make	Model	Material	Method of Application	Interference Fit (in.)	Hardness Rockwell	A (in.)	B (in.)	C (in.)	D (in.)	E (in.)	Fig. No.
Allis-Chalmers	K & L	H. S. Tool Steel	Press	0.003–0.005		2.379 / 2.381	2-1/32	.248 / .252	3/64 × 20°	3/64 × 20°	1
Chrysler, Dodge, Plymouth	All Models	Alloy Cast Iron	Dry Ice	0.0035 See Art.	C 50-60			.245 / .250	3/64 × .008 / .010	1/64 × 30°	1
Continental	16R, 18R, 20R, 21R, 22R, E600, E601, E602, E6 2, 20C C400, C600	(C400) 18% Tungsten H. S. or T. P. 12	See Art.			1.3285 / 1.3275	1.068 / 1.058	.156 / .151	.030 / .020 × .012 / .010	.030 / .020 × 45°	1
		(16CA) 18% Tungsten H. S. or T. P. 12	See Art.			1.5785 / 1.5775	1.318 / 1.308	.250 / .245	.030 / .020 × .012 / .003	.030 / .020 × 45°	1
		(20RA) 18% Tungsten H. S.	See Art.			1.9815 / 1.9810	1.630 / 1.620	.250 / .248	.030 / .020 × .012 / .008	.060 / .050 Rad.	1
Ford	V & Pass. & Truck	15% Tungsten Steel	Liquid Air		C 38-46						1
Franklin	See Article.										
G. M. T. Co.	331, 400, 450, 525, 616, 707.	Stellite Faced	Screwed-in Dry Ice								3 & 4
Hercules	Wx and OX Series	Super C. I. Alloy	Press and Roll	0.007	B 96-102	1.8797 / 1.8790	1-1/2	1/4	1/32 × .008 / .012	1/32 × .008 / .012	5 & 1
	YX and RX Series	Super C. I. Alloy	Press and Roll	0.008	B 96-102	2.1305 / 2.1295	1.755 / 1.745	1/4	1/32 × .008 / .012	1/32 × .008 / .012	5 & 1
	HX Series	Super C. I. Alloy	Press and Roll	0.008	B 96-102	2.3805 / 2.3795	2.005 / 1.995	1/4	1/32 × .008 / .012	1/32 × .008 / .012	5 & 1
	TX Series	Spec. Alloy C. I.	Press and Roll	0.015		3.140	2.505 / 2.495	9/32	1/32 × .008 / .012	1/32 × .008 / .012	5 & 1
Le Roi	RA Series	Super C. I. Alloy	Press and Roll	0.004–0.006		2.881 / 2.880	2-1/4	3/8			1
	RX Series	Super C. I. Alloy	Press and Roll	0.004–0.006		3.1315 / 3.1305	2-1/2	3/8	1/64 × 1/32	1/64 × 1/32	1
	J Series	Super C. I. Alloy	Press and Roll	0.004–0.006		2.4430 / 2.4420	1-31/32	5/16			1
Lycoming	ASE, SA, SB, HFA, AEF	H. S. Tool Steel	Press and Roll		C 50-60	Varies with Eng			1/32 × .012 / .008	1/32 Rad.	1 & 5
Reo	S3 and S5	H. S. Tool Steel	Press and Roll	0.003–0.004	C 50-60	1.9415 / 1.9414	1.630 / 1.620	.224 / .219	3/64 × 10°	1/64 × 45°	1, 2 & 5
	N	H. S. Tool Steel	Press and Roll	0.003–0.004	C 50-60	1.8155 / 1.8154	1.505 / 1.500	.224 / .219	3/64 × 10°	1/64 × 45°	1, 2 & 5
Sterling	Petrel	H. S. Tool Steel	Press and Roll			2.634 / 2.633	2.246 / 2.247	.3140 / .3125	1/32 × 10°	1/64 × 45°	1 & 5
Waukesha	6M Series	C. I. Alloy No. 206 (Heat Treated)	Press and Roll	0.007–0.009		2.008 / 2.007	1.630 / 1.620	.250 / .248	1/32 × 45°	1/32 × 45°	1
	6-90 Series	C. I. Alloy No. 206 (Heat Treated)	Press and Roll	0.006–0.008		1.8195 / 1.8185	1.442 / 1.432	.219 / .217	1/32 × 45°	1/32 × 45°	1
	XAH Series	C. I. Alloy No. 206 (Heat Treated)	Press and Roll	0.006–0.008		1.632 / 1.631	1.380 / 1.370	.219 / .217	1/32 × 45°	1/32 × 45°	1

sisting of an alloy iron ring having the same coefficient of expansion as the cylinder block, with a facing of Elkonite. The composite construction is said to give comparable results with the solid Elkonite seats, of course at greatly reduced cost. It is interesting to note in this connection that whereas the tendency is toward extremely hard seats, Elkonite may be termed a "soft" material to the extent that it can be machined quite readily with standard tools. However, it is said to have the property of resisting abrasion and wear to a remarkable degree under conditions of elevated temperature.

As to hardness, which has already been noted above, the practice as indicated in Table 1 is to carry the hardness within the range of 50 to 60 Rockwell C scale.

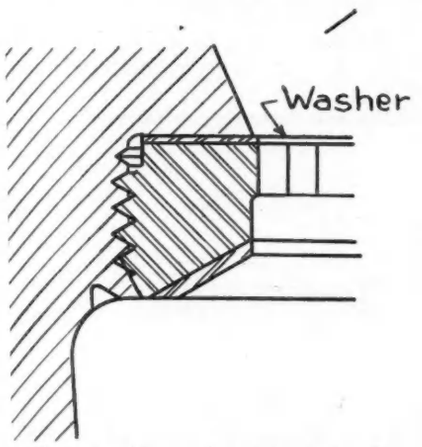


Fig. 4—General Motors truck insert is screwed into head against soft steel washer which assures good heat conductivity

Fig. 1 shows what might be termed the standard form of inserted valve seat fabricated from alloy cast irons and high-speed tool steels. The dimensions generally used will be found in detail in Table 1.

While it is not necessary for our purpose to go into the details of insert manufacture, it is important to note that suppliers treat this part as one demanding a high degree of finish and great precision. In general, special automatic grinders are used to produce concentricity of the outside diameter with respect to the axis, also to maintain positive squareness of the upper and lower faces with respect to the axis.

The chamfer on the lower face is used for guiding the insert in the counterbore while the bevel on the upper face is utilized in the constructions where the block metal is rolled over on the insert. Incidentally, for this purpose the dimensions on the top face bevel are maintained within close limits.

Fig. 2 shows a variation in the standard form, common for high-speed tool steel and bi-metal inserts, where an additional locking means is provided by the use of four notches cut in the periphery of the ring. This construction is used by Hercules, Reo and others.

The Stellited bi-metal valve seat used on the heavy-duty General Motors truck engines is shown in Fig. 3. It consists of a threaded steel ring with a series of internal splines for facilitating assembly, faced with No. 6 Stellite, which is puddled in place by acetylene welding. The hardness of the Stellite surface runs between 45 and 50 Rockwell C scale.

We understand that a rather similar construction is used on commercial engines built by A.E.C. and Leyland in England.

Beginning with 1934 production, valve inserts for engines in the Chrysler Corp. have been installed by shrinking in a dry ice chamber to a temperature of minus 100 deg. Fahr. The total amount of interference fit is approximately 0.0035 in.; 0.002 in. being obtained by shrinking with dry ice, the remaining 0.0015 being left for pressing. The press fit is accomplished by a standard procedure of two hammer blows struck lightly on the upper end of a mandrel which enters into the valve stem guide, carrying the insert on its outer diameter.

General Motors Truck engines are fitted with the insert assembly shown in Fig. 4. The total interference fit in the thread is about 0.005 in., and at assembly the threaded ring is contracted in dry ice while the head is expanded by heating in boiling water. To insure metal-to-metal contact all around, a dead soft temper strip steel washer (28 U. S. gage) is pushed into the bottom of the counterbore before the ring is screwed in and the ring is then screwed down onto the washer.

For locking, the cast iron around the outside diameter of the insert is rolled into the chamfer, the metal being peened into the notches.

On the Ford V-8, inserts are chilled in a vacuum jar containing liquid oxygen, to a temperature of minus 90 to minus 100 deg. Fahr. and then inserted by striking with a tool especially shaped at the end to hold the insert without distortion. It is claimed that the combination of shrinkage by cooling and insertion

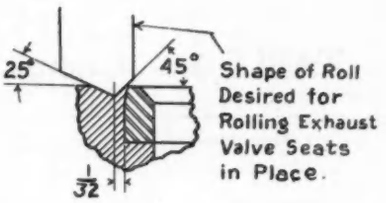


Fig. 5—Method of rolling cylinder block material around the insert. Note proportions of rolling tool. In this construction, the dimensions of the top bevel are held to close tolerances

under pressure is sufficient to retain the insert permanently. The hardness of the cylinder block around the valve inserts is from 207 to 214 Brinell.

The generally accepted procedure for peening the cylinder block material over the insert is illustrated in Fig. 5. As is evident, the peening action is accomplished by rolling with a specially-formed tool.

Continental Motors Corp. uses a combination of heating and chilling. Thus, at assembly the block is heated in hot water to 180 deg. Fahr., while the insert is contracted with dry ice to about minus 90 deg. Fahr. The seats are then pressed into place and the block material rolled over the insert for locking.

Sterling Engine Co. has been using two alternate types of inserts on the Petrel marine engine—one a heat-resisting steel ring; the other, a hard-faced ring. Their practice is simply to allow a light press fit and then to roll the block material over the insert. An interesting variation from the usual practice is

Table 2

List of Suppliers Valve Seat Inserts

Manufacturer	Material
Albertson & Co....	Alloy Cast Iron
Haynes-Stellite Co.	Bi-Metal
P. R. Mallory & Co.	Elkonite Composite
Thompson Products, Inc.	Durachrome
Wilcox-Rich Corp..	H. S. Steel Bi-Metal

TABLE 3 Chemical Analysis Valve Seat Insert Materials

Manufacturer	Type Material	Trade Name	Tungsten *	Copper *	Molybdenum *	Chromium *	Silicon *	Carbon *	Manganese *	Nickel *	Vanadium *
Albertson & Co.	Alloy C. I.	Super C. I. Alloy			0.45–0.55		1.10–1.20	1.60	0.60–0.70	1.00–2.00	
Albertson & Co.	Alloy C. I.	Albertson Spec.			0.35–0.40	0.30–0.40	1.75–2.00	3.20–3.40	0.60–0.70	1.25–1.50	
Ford Motor Co.			14.0–16.0			2.50–3.50	0.30–0.60	1.20–1.40	0.30		
H. H. Franklin Mfg. Co.	Cast Alloy			5.50–6.50		2.00–2.25	1.25–1.50	2.80–3.10	1.00–1.50	13.50–14.50	0.75–1.50
Haynes-Stellite Co.		Stellite	COBALT — CHROMIUM — TUNGSTEN								
P. R. Mallory & Co.		Elkonite	75	Yes							
Reo Motor Car Co.	H. S. Steel		17.0–19.0			3–5	0.25 max.	0.65–0.75	0.30 max.		
Thompson Products, Inc.	Alloy C. I.	Durachrome			5.00	3.00	1.25	2.00			

*—Figures given in percentages.

that the Sterling seats are knurled slightly around the outside diameter, the depth of the knurling being increased toward the outer face so that little or no knurl is found on the outer diameter near the bottom face. This construction has been watched very carefully in service and is found to hold the seat securely in place.

It is noteworthy that Sterling has aimed to avoid the use of extremely hard seats in view of the problem of refacing, inasmuch as many of the large engines are in isolated places where suitable grinding equipment may not be readily available.

On the Franklin engine which features the Y-metal head, the insert is installed by heating the cylinder head to about 500 to 550 deg. Fahr. at which temperature the insert can be readily pushed in on an arbor press. This method has been used for a number of years and was described completely in *Automotive Industries* several years ago.

Fig. 6 shows a special tool recommended by Thompson Products for pressing inserts by hand. The method is said to be quick and simple. The tool pilots in the valve guide, also on the inside diameter of the seat, force being applied through the top of the seat. This is an important point since a hammer blow applied to the bevel will tend to spread the seat. Just before the insert touches the bottom of the counterbore, chips and dirt should be blown out with an air line and then the insert seated.

It is said that as many as 110 blocks per hour have been put through a single production line by this method and all inserts held to an indicator reading of 0.001 in. with the center of the guide.

According to correspondence with Mr. H. Andrews of The Harold Andrews Grinding Co., England, Stellite-faced inserts have gained considerable acceptance among heavy-duty engine builders in England. Two types of construction are used, one similar to the bi-metal assembly in Fig. 3, the other a special Stellite-faced, steel locking ring Fig. 7, which is patented by Mr. Andrews' organization.

As shown in Fig. 7, besides pressing the ring into a counterbore with an interference fit, it is positively retained by means of locking ring fitted in a groove. The locking ring is of square section material and fits halfway in the counterbore and bi-metal insert. It is claimed that these bi-metal seats have been used over 100,000 miles without requiring attention.

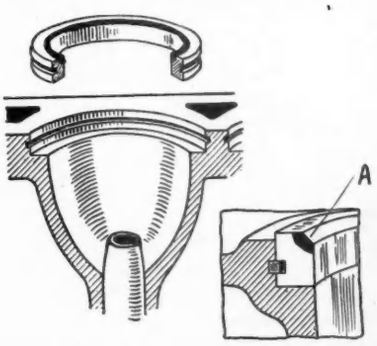


Fig. 7—Positive locking renewable valve seats patented by The Harold Andrews Grinding Co., Ltd.

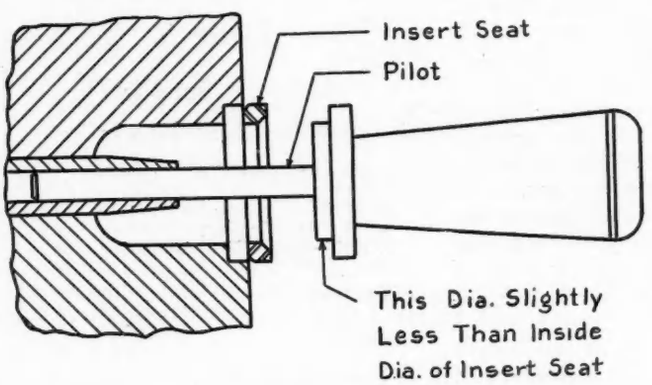


Fig. 6—Tool recommended by Thompson Products for pressing in the insert. The tool pilots in the valve guide and also on the inside diameter of the seat; pressure is transferred over the top surface of the ring

In general the interference fit is being reduced considerably from the practice which was originally followed. For example, barely a year ago the recommended fit was from 0.005 to 0.008 in. whereas now Thompson Products recommends a press fit of 0.003 to 0.005 in. on small diameters. As will be noted in Table 1, the interference fit is gradually increased with an increase in the diameter of the insert.

It might be noted in passing that the present development of hard inserts as well as the practicability of the assembly and service operations have been brought about by the availability of new items of precision grinding and facing equipment. Thus, just to name a few, we find Heald and Landis grinders widely used in form-finishing of inserts; and after assembly the valve seats are faced by means of high-speed eccentric grinders of which the Hall equipment is typical.

No concern need be felt about the servicing of these inserts inasmuch as the equipment manufacturers have already met the demand with suitable portable grinders. Many of the best known makes now on the market will be found in an article on valve insert maintenance in *Automobile Trade Journal* (a Chilton publication), for April, 1934.

Finally, the following conclusions may be drawn from an analysis of data on current practice.

1. That a measure of standardization and simplification has been achieved both in the form of inserts and range of materials.

2. That the art has been resolved into a minimum of alternate methods of assembly with a decided tendency to smaller interference fits and a very definite tendency to preshrinking by means of dry ice, or liquid oxygen, as a substitute for the time-honored practice of heavy mechanical pressures.

3. The use of valve inserts is now an almost universal practice on heavy-duty engines.

4. There is still a decided division of opinion in the passenger car field with Ford, Chrysler and Reo among those in favor of inserts.

5. There is ample evidence under the surface of a concerted research program on the part of both engine builders and manufacturers of inserts which should shortly result in still greater progress in the way of standardization of insert forms and simplification in the variety of materials, although at this writing these elements have certainly reached a low value.

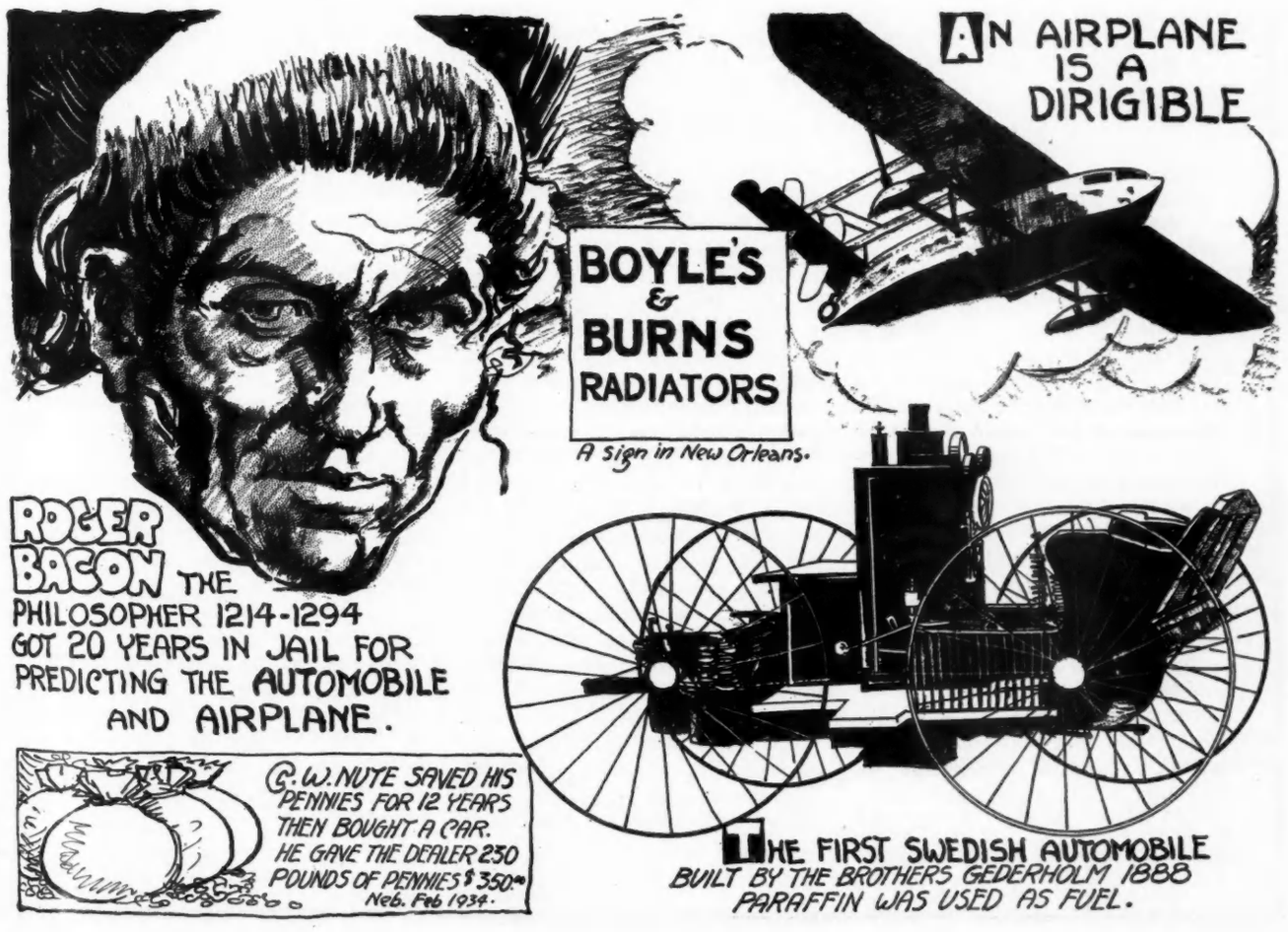
6. Much of the credit for the standardization of form and development of suitable materials unquestionably is due to the suppliers of the inserts who have cooperated so whole-heartedly in this development.

Truck Coupling Has Rubber Cushions

A line of truck couplings with molded blocks of rubber to cushion shocks has been announced by the Fruehauf Trailer Company of Detroit. These couplings, when installed on the rear cross member of a truck, make it possible to do towing jobs of various kinds and to haul a four-wheel trailer.

Two types of connection are available, viz., the hook type and the conventional clevis type. The rubber cushion, which replaces the draft spring formerly used, is completely enclosed and is designed to absorb both vertical and horizontal shocks.

Automotive Oddities—By Pete Keenan


AN AIRPLANE IS A DIRIGIBLE
BOYLE'S & BURNS RADIATORS
A Sign in New Orleans.
ROGER BACON THE PHILOSOPHER 1214-1294 GOT 20 YEARS IN JAIL FOR PREDICTING THE AUTOMOBILE AND AIRPLANE.
G. W. NUTE SAVED HIS PENNIES FOR 12 YEARS THEN BOUGHT A CAR. HE GAVE THE DEALER 230 POUNDS OF PENNIES $350.00
Neb. Feb 1934.
THE FIRST SWEDISH AUTOMOBILE
BUILT BY THE BROTHERS GEDERHOLM 1888
PARAFFIN WAS USED AS FUEL.

JUST AMONG OURSELVES

Re-employment Or Rulings?

THE way of the peacemaker—as well as that of the transgressor—has a way of being hard; sometimes harder. It is our guess that the Automobile Labor Board is finding itself no exception to that rule. Even the notably fair-minded administrations of Dr. Leo Wolman haven't pleased the A. F. of L. Partisans are likely to want partisanship rather than impartiality. The latter seems to be all that Doctor Wolman has to dispense.

William Green said recently that Detroit workers were dissatisfied "because of the failure of the Automobile Labor Board to function properly and effectively." "The workers allege," he continued, "that thus far no decision has been made upon the merits of any case of discharge or discrimination for union activities and union membership, this notwithstanding the fact that the board was appointed for the specific purpose of making decisions upon cases of discharge and discrimination presented with the understanding that the decision of the board would be final and binding upon both employers and employees."

As nearly as we can make out, the Automobile Labor Board, looking to the building of permanently satisfactory industrial relationships, has been working to function as an authoritative intermediary in the settling of industrial disputes between industry and labor. It is trying chiefly to bring about settlements by mutual agreement, apparently acting merely as a judge only when mutual agreement cannot be reached. Certainly this policy would seem to be building the only possible basis for permanently peaceful functioning between management and workers. Their everyday relationships cannot successfully be conducted forever on the basis of running to an umpire to decide technicalities every few minutes.

While the Wolman method has not resulted in a series of "rulings," such as Mr. Green would seem to wish for, it has resulted in the reemployment in automobile plants of several hundred men—a very high percentage of the men allegedly discriminated against. The fact is more important than the form.

* * *

Industry Has Tried Seasonal Price Cuts

SECRETARY of Labor Frances Perkins thinks that stabilization of employment might be furthered greatly in the automobile industry if progressive steps were established on cars to encourage buying in the summer and fall and to lessen it in the normally active spring.

Everybody in the industry would be delighted if stabilization could be achieved in so simple a fashion. Manufacturers actually want stabilization—very sincerely want it. Adequate exposition of Miss Perkins' not-too-new idea would require extended discussion for which space is lacking. One point is pertinent, nevertheless.

In pre-NRA days when used car trading allowances were uncontrollable, we had, in effect, just about the condition that Miss Perkins urges. After models had been on the market for a while and the peak of spring buying had passed, trading allowances very definitely tended to increase. As time for another new model drew nigh, trades got longer and longer during the period generally referred to in the trade as the "cleanup" period. These long trades generally amounted simply to decreases in the price of the new car.

Miss Perkins might counter by declaring that new models also are an iniquity—which would just open another related field for discussion.

* * *

Hitch-Hiking On the Wane

MORE "ten-minute eggs" among motorists are indicated by the American Automobile Association as the reason for the decrease in the number of hitch-hikers since 1929, which the motorists' association claims has taken place. "The willingness with which motorists at first gave free transportation led to a regular invasion of the highways—until car owners got sick and tired of the practice and became hard-boiled. As a result, the hitch-hikers swarmed back to the rails."

We should be opposed to hitch-hiking on principle, we suppose; in fact, we always have been, up until the other night when we went to see Colbert and Gable in "It Happened One Night." Now we keep one eye peeled all the time in hopes Claudette might be looking for another lift sometime.

And while we are in a confessional mood, we might as well admit that the King of Jugoslavia has achieved our life ambition. Two new cars just shipped for the use of the King and Queen, Packard publicity says, are equipped with New York police type sirens and with special red and green headlamps. "With these, the royal cars can be identified day or night, for *no signals like them are permitted on other motor cars in the country.*"—N. G. S.

"Back on the Bench Is Where Personnel Department Belongs"

W. S. Knudsen says in speech urging industry to restore foreman to his pre-war importance

W. S. Knudsen, G. M. executive vice-president, whose views are reported here

WHEN we talk about interest, we can talk about majority interests, minority interests, or we can talk about common interests.

There are two sets of people in the field today, one set who claims that we dominate, or try to dominate our workmen; and the other school which says that we take the minimum amount of interest in our workmen, and we think more of dollars than we think of lives.

I would like to take exception to a statement or a thought of that sort. We in the industry think of our labor problem, or our labor relationship as one of common interest, and until we get on the basis of common interest, not until then will we have reached the ultimate in cooperation between management and labor.

Considering what our duty is toward labor, it can be stated about as this: First, we must pay a fair and adequate wage; second, we must supply modern, up-to-date factories and equipment; and, third, we must look after the health and safety of our people while they are in the plant.

So much discussion has been raised recently about wages, that the issue as to what is a fair wage, is somewhat confused. A certain school in this country feels that we should take care of the maximum number of people at the maximum wage, and place the costs of that in the product. This is unsound. It is uneconomical, because in doing this, spreading the available wage over too great a number of people, we eliminate the purchasing power that made wages possible in the first place. In my opinion, industry should manage plants to the extent that a reasonable return in weekly wages can be paid to the workmen, and thus preserve the purchasing power.

On the second point, that we must have modern and up-to-date equipment, I think industry today realizes that unless we have these things we are going to be handicapped in a competitive market, and therefore good tools and good equipment and modern plants are conducive to efficiency and lower costs.

On the third point, that of safeguarding the health of employees and preserving them from injury, I think this gathering is even more familiar with that subject than I am. In safety is really meant knowledge and experience. Most people that get hurt in our plants, crippled or killed, are with very few exceptions people whose experience in that particular field has not been proven. Sometimes in the stress of adding to the working force too quickly, there has not been sufficient time for instruction against the dangers in operating machines, and a good many people, unfortunately, are hurt. Generally the blame for accidents is laid on speed, but in my experience speed hasn't anything to do with it. Inexperience, carelessness, and lack of proper understanding of the machine account for most of the accidents.

We all have heard a lot lately about a new deal in industry. It has been a subject of hours of speeches, miles of columns of publicity, and reams of books. I feel that we are not getting into a new deal in industry, but that we are going back to the old deal in industry, which existed previous to the extremely rapid industrial development subsequent to the war.

I refer now to the shop management which dealt with men in great masses right after the war, rather than with departments. I refer to the practice which gradually left the foreman of a gang of men with only the privilege of being called down for something, but with most of his duties criss-crossed by organization lines of other kinds. He couldn't hire his men, sometimes he couldn't fire them. Most of the time he had little or nothing to do with the planning of the job he had in charge. Often the tools were never inspected by him until a job was set up. A lot of statistics furnished the basis for conclusions of the management, and that was called "industrial science."

I should like to go on record as saying that the "industrial science" that I look forward to, will be the relationship that re-establishes the line of authority in the shop on the basis of cooperation between the men and the foremen. Here, as I see it, is our problem, and it should be our problem for years to come.

I hope we will get back to the time when the so-called personnel department was out on the bench. I hope that we will get back there. It is fine to keep the records of it over in the front, but back on the bench is where the personnel department belongs, and that is where you are going to get the greatest benefit from it.

I hope also that we are going to be able to operate with a semblance of a profit. Somehow, recently it has become unfashionable to make a profit. No one seems to realize what you are going to live on in years to come, unless it is profit.

I plead with you to go out into your factory and gather up the bottom strata. Somebody else has been trying to gather it up while you were not looking. I know that applies to me, and I feel that it is a perfectly simple thing to gather this stuff back in the fold again, and get it setting where it ought to be. Don't forget this: Profits are made on the bench; profits are lost on the bench. Nobody ever made any money laying men off. You have got to try and keep them on, but in a reasonable number.

Liquefied Petroleum Gases Boost

High octane ratings permit big jump in compression ratios—Distribution and mixing problem greatly simplified

by G. R. Benz and E. Q. Beckwith*

THE potential field of application for liquefied petroleum gases as fuels for internal combustion engines is practically unlimited. The purpose of this article is to indicate in a general way the existing applications, as well as to discuss briefly the inherent characteristics of these gases, which make them ideal internal-combustion-engine fuels.

Propane and butane are the principal liquefied petroleum gases commercially available. They are members of the paraffin series of hydrocarbons, which series constitute the largest portion of ordinary gasoline. These fuels have the same physical appearance as ordinary gasoline, in that they are colorless, but differ in that they are first obtained as gases and later are liquefied to concentrate their thermal value, for purposes of economical transportation and storage. Liquefied petroleum gases, as the name implies, are shipped as liquids in special tank cars, under their own vapor pressure. The vapor pressure varies with existing temperatures.

Liquefied petroleum gases have all the desirable characteristics of gasoline for motor fuel, in addition to many other advantages not available in any other engine fuel.

Liquefied petroleum gases have very high anti-knock ratings. The octane number of propane is 125, and of butane 93, or greatly in excess of even the finest premium grades of aviation gasoline now available. The very high anti-knock characteristics of these fuels permit the use of high compression ratios, resulting in increased thermal efficiency and power output, and in the attendant decrease in specific fuel consumption.

While the desirable features of high compression engines are difficult to evaluate in dollars and cents, to the engine user, they have, nevertheless, proved to be commercially practical and economical, and engines having high compression ratios are in common and successful use.

Liquefied petroleum gases are shipped as liquids, but utilized as gases. The more intimate mixing of the combustible charge obtainable with the gas mixer used than that resulting from liquid fuels and liquid carburetors, results in combustion being more nearly perfect over the entire operating range of the engine. There is no mixture distribution problem. Carbon deposits on combustion chambers, valves and piston heads are virtually eliminated, due to the thorough proportioning and mixing obtainable under widely varying loads. It is possible to achieve considerably lower temperatures on the incoming charge of air and gas with liquefied petroleum gases than with gasoline by using the latent heat of vaporization as a means of cooling the air for the charge. Permitting the liquefied petroleum gas to vaporize in the fuel tank or in a controlled temperature vaporizer also provides, under most conditions, a cold gas charge to the air-gas mixer at the engine.

Since liquefied petroleum gas is

Comparative Test Results

Obtained At Full Throttle With Propane—Butane—Gasoline On a 6-Cylinder 4 by 5-In. Engine

Fuel	Compression Ratio	CORR. Max. H.P.	Average Specific Fuel Consumption (Actual Test Data) Lb. Fuel per BRP.-HR.	B.T.U. per BHP.-HR.	Per Cent Increase In B.H.P. Over Gasoline at 4.38 C.R.	Per Cent Decrease in Specific Fuel Consumption, Lb. Basis	B.T.U. Basis, Per Cent	Octane No.
Propane	9.95	99.0	0.458	9,920	56.2	30.9	26.6	125
Butane	6.75	86.8	0.512	11,000	37.0	22.80	18.6	93
Gasoline	4.38	63.4	0.663	13,517	...	...	...	61

*Philgas Co., Detroit.

Power and Cut Fuel Consumption

vaporized in the fuel tank, or in a separate vaporizer, rather than at the carburetor as in the case of gasoline fueled engines, quick starting and immediate response is obtained even from very cold engines. There is no crankcase dilution. The carburetor is eliminated and a gas-air mixing valve used. Due to the greater volume occupied by the gas charge as compared to a liquid (gasoline or oil) charge, more accurate proportioning of the air and gas is obtained over the entire operating range from idling to full throttle. Carburetor and fuel line vapor-locking, often troublesome in gasoline-fueled engines, is eliminated, since the gas is carried from the fuel tank through the gas-air mixer by means of vapor pressure of the liquefied petroleum gas in the fuel tank.

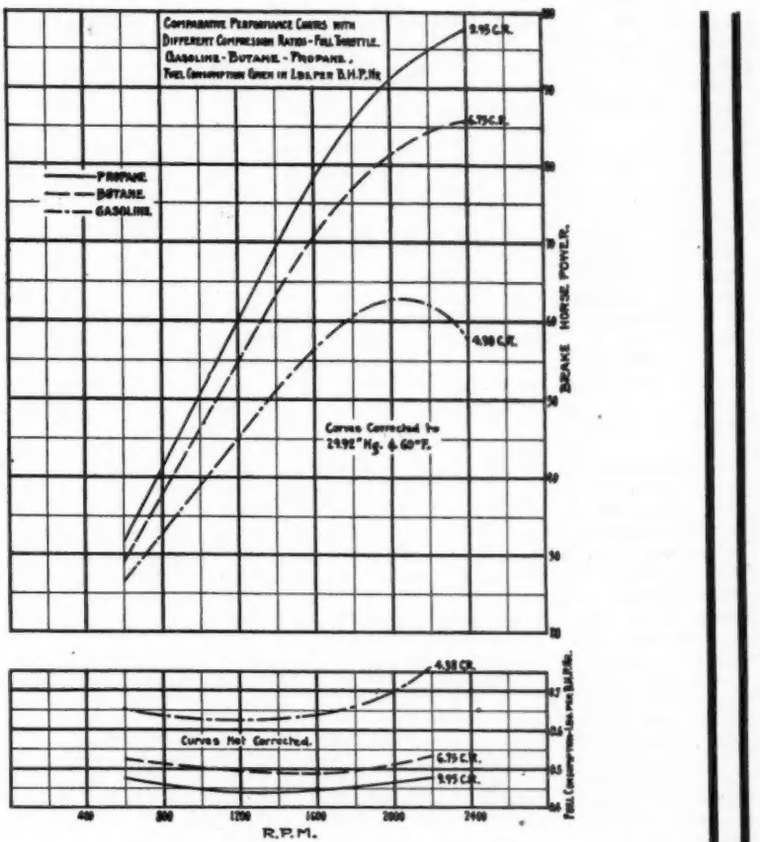
It is interesting to note that propane has the highest B.t.u. value per pound of any commercially available fuel.

Propane	=21,480	B.T.U. per lb.
Butane (Normal)	=21,300	B.T.U. per lb.
Pentane	=20,950	B.T.U. per lb.
70° A.P.I. Gasoline	=20,640	B.T.U. per lb.
60° A.P.I. Gasoline	=20,240	B.T.U. per lb.
34° A.P.I. Gas Oil	=19,650	B.T.U. per lb.
27° A.P.I. Fuel Oil	=19,375	B.T.U. per lb.

Further, liquefied petroleum gases are uniformly constant in quality and properties and are, for all practical purposes, single component hydrocarbon fuels as contrasted to gasoline and fuel oils, which are multi-component fuels.

The absence of obnoxious exhaust gas odors, smoke and soot make liquefied petroleum gases most desirable fuels for internal combustion engines wherever the human or personal element is a factor, having major influence on the success or sale of the service or facility being rendered.

The much greater permissible compression ratios with liquefied petroleum gases have been carefully checked by a series of exhaustive tests on many engines, including a high-speed engine of 4 in. bore by 5 in. stroke and having a piston displacement of 377 cu. in. These tests indicated that the maximum compression ratio permissible on this engine was 4.38 to 1.0 for gasoline, 6.75 to 1.0 for butane and 9.95 to 1.0 for propane. The table on the opposite page gives a summary of the data obtained in these tests.



Horse powers and specific fuel consumptions with propane, butane and gasoline, using the highest useful compression ratios

Liquefied petroleum gases are available at many production points throughout the United States, from which tank-car shipments can be made. Since propane is widely used as a domestic cooking gas (bottled gas), it is available in small cylinder lots also throughout most of the country. However, when purchased in less than carload lots the price is very considerably higher than that of gasoline, owing to the higher costs of transportation and handling.

On a tank-car basis, costs are directly comparable with those of gasoline, the cost at the refinery being about the same, and the freight classification being the same also. Thus for use in stationary engines acting as prime movers for generators, pumps and compressors, where tank-car lots of liquefied petroleum gas may be purchased, the price per gallon in most areas is on a level with that of a good grade of gasoline. Owing to the much higher efficiency obtainable in engines properly designed for the use of propane, the operating cost will compare favorably with that for gasoline even when the price per gallon is the same.

The large increase in B.H.P. and decrease in specific consumption obtained with the use of propane over gasoline are indeed worthy of consideration by all engineers desiring to increase internal combustion engine efficiency and thereby improve our available transportation facilities.

31 Parts Makers Earned

	Net Income After Deducting Taxes (000 Omitted)					Dividends (000 Omitted)				
	1929	1930	1931	1932	1933	1929	1930	1931	1932	1933
American Chain	$3,279	$1,685	*d$2,183*	*d$2,986*	*d$432*	$935	$1,471	$1,008	.....	.....
Bendix Aviation	7,417	1,251	1,555	*d1,601*	1,243	3,126	3,608	2,097	$315	.....
Bohn Aluminum	2,620	726	295	*d721*	1,495	1,580	793	529	.....	$352
Borg-Warner	6,685	2,318	1,208	*d598*	1,196	4,365	3,609	1,461	530	518
Briggs Mfg. Co	2,427	4,036	684	*d1,896*	1,591	.....	1,002	2,994	490	.....
Budd Mfg. Co., E.G.	1,534	21	*d730*	*d1,786*	*d887*	1,566	1,218	.....	.....	.....
Budd Wheel	1,791	1,457	183	*d1,387*	*d491*	577	1,094	808	29	.....
Campbell, Wyant & Cannon	1,279	638	191	*d313*	40	663	738	343	.....	.....
Eaton Axle	1,502	1,205	243	*d674*	360	894	1,479	743	82	131
Electric Autolite	14,514	5,043	3,914	1,364	684	5,694	5,872	4,767	1,987	293
Electric Storage Bat.	7,911	5,647	2,770	1,260	2,022	4,542	4,579	4,013	2,198	1,815
Hayes Body	*d245*	*d853*	*d880*	*d294*	*d288*	.....	.....	.....	.....	.....
Houdaille Hershey	1,519	*d157*	102	*d590*	114	1,080	856	436	108	.....
Lycoming	713	*d586*	1,240	*d456*	*d593*	81	70	81	75	71
Marlin Rockwell	2,707	922	*d23*	*d123*	111	2,182	2,003	728	308	236
Midland Steel Prod.	2,555	1,272	776	*d221*	673	1,637	1,660	1,597	759	664
Motor Products	2,141	487	*d18*	*d518*	*d217*	2,079	392	388	286	.....
Motor Wheel	3,480	987	*d572*	*d1,187*	122	1,985	2,484	839	.....	.....
McCord Radiator	618	11	*d284*	*d649*	25	332	295	61	.....	.....
Mullins Mfg	477	11	100	*d696*	*d268*	210	206	151	.....	.....
Murray Corp	1,308	234	*d1,241*	*d1,881*	*d777*	827	17	17	16	16
Raybestos-Manhattan	3,206	1,157	554	*d457*	685	1,538	1,728	1,389	453	386
Reynolds Spring	115	*d182*	*d195*	*d192*	49	.....	.....	.....	.....	.....
Ross Gear & Tool	566	336	246	124	139	360	375	270	225	129
Spicer Mfg. Co	2,120	40	*d1,016*	*d1,414*	*d131*	300	300	280	264	216
Stewart-Warner	6,839	1,262	*d1,830*	*d2,445*	*d1,791*	4,178	2,750	.....	.....	.....
Thompson Products	1,231	106	*d107*	*d182*	174	606	654	336	85	.....
Timken Detroit Axle	1,513	842	328	*d1,194*	*d1,257*	1,017	996	388	194	194
Timken Roller Bear.	14,155	7,524	2,571	*d483*	2,173	7,223	7,236	6,029	3,316	1,688
Trico Products	2,250	1,908	1,763	965	1,418	834	937	937	937	937
L. A. Young	2,213	1,295	522	*d196*	418	1,102	1,167	874	388	103
Totals	$100,440	$40,643	$10,166	*d$21,427*	$7,600	$51,513	$49,584	$33,564	$13,045	$7,749

	Plant and Property (000 Omitted)					Good Will, Patents, Etc. (000 Omitted)				
	1929	1930	1931	1932	1933	1929	1930	1931	1932	1933
American Chain	$13,136	$13,453	$12,614	$11,758	$10,871	$2,649	$2,429	$1,899	$832	$635
Bendix Aviation	7,985	11,945	11,486	10,196	9,634	33,281	36,672	36,801	.....	.....
Bohn Aluminum	5,115	5,162	5,029	2,693	2,564	181	150	134	124	104
Borg-Warner	17,545	18,394	17,665	15,750	14,248	679	546	465	421	405
Briggs Mfg. Co	20,446	21,417	19,901	11,039	9,840	.....	.....	.....	.....	.....
Budd Mfg. Co., E.G.	14,142	13,578	15,055	12,034	12,058	295	197	219	.....	.....
Budd Wheel	2,643	2,839	2,888	2,466	2,246	1,284	1,284	1,334	1,334	1,334
Campbell, Wyant & Cannon	3,875	3,875	3,573	3,363	3,190	.....	.....	.....	.....	.....
Eaton Axle	7,943	10,908	7,720	7,476	6,832	337	298	282	271	223
Electric Autolite	11,280	12,555	11,304	8,238	7,625	.....	.....	.....	.....	.....
Electric Storage Bat.	13,018	12,455	11,497	10,715	9,965	.....	.....	.....	.....	.....
Hayes Body	3,661	3,361	3,137	2,263	2,060	.....	.....	.....	.....	.....
Houdaille Hershey	4,635	4,846	7,344	7,104	6,404	.....	.....	.....	.....	.....
Lycoming	2,865	3,289	3,488	3,335	2,976	.....	.....	.....	.....	.....
Marlin Rockwell	2,599	2,463	2,099	1,856	1,627	.....	.....	.....	.....	.....
Midland Steel Prod.	6,014	5,734	5,377	4,933	4,729	1,675	1,675	1,675	1,916	1,920
Motor Products	4,364	4,153	3,918	3,647	3,584	.....	.....	.....	.....	.....
Motor Wheel	7,230	7,052	6,693	6,273	5,588	.....	.....	.....	.....	.....
McCord Radiator	4,140	3,526	3,175	2,732	2,339	.....	.....	.....	.....	.....
Mullins Mfg	4,434	4,578	4,980	3,235	1,745	86	89	94	14	22
Murray Corp	20,790	20,123	19,869	10,099	9,640	301	301	296	.....	.....
Raybestos-Manhattan	7,543	7,401	7,014	6,769	6,453	595	595	595	595	595
Reynolds Spring	3,880	1,806	1,760	1,721	1,642	734	.....	.....	.....	.....
Ross Gear & Tool	1,599	1,521	1,402	1,310	1,324	39	36	33	31	29
Spicer Mfg. Co	8,807	7,885	6,785	4,652	4,061	209	188	174	.....	.....
Stewart-Warner	17,211	16,759	12,411	11,794	8,992	.....	.....	.....	.....	.....
Thompson Products	3,298	3,445	3,498	3,459	1,953	834	833	830	827	824
Timken Detroit Axle	7,730	7,761	7,491	6,819	6,078	.....	.....	1,684	1,684	1,624
Timken Roller Bear.	23,207	22,647	20,715	18,769	17,288	.....	.....	.....	.....	.....
Trico Products	1,601	1,586	1,655	1,606	1,497	351	350	337	336	339
L. A. Young	4,028	3,909	3,715	3,355	3,517	479	275	275	275	1,110
Totals	$256,764	$260,426	$245,258	$201,459	$182,575	$44,009	$45,918	$47,127	$8,660	$9,155

$7,600,000 Net in 1933

Continued on Next Page

	Cash and Securities (000 Omitted)					Receivables (000 Omitted)				
	1929	1930	1931	1932	1933	1929	1930	1931	1932	1933
American Chain...	$969	$1,582	$996	$1,403	$1,248	$5,862	$4,381	$2,759	$1,902	$2,472
Bendix Aviation...	8,132	4,761	3,941	3,537	4,996	2,331	2,269	1,870	1,344	1,525
Bohn Aluminum...	2,948	1,178	460	483	79	1,242	913	683	475	909
Borg-Warner	8,401	7,199	7,175	7,493	7,637	3,188	2,270	2,337	1,269	1,729
Briggs Mfg. Co....	2,324	12,859	7,540	6,691	6,913	5,893	1,339	760	1,294	3,741
Budd Mfg. Co., E. G.	2,255	1,656	402	757	307	1,877	1,870	1,997	1,613	1,107
Budd Wheel.....	588	1,411	524	105	105	968	986	749	225	682
Campbell, Wyant & Cannon	569	831	790	770	618	484	353	196	143	278
Eaton Axle	1,212	2,261	2,562	2,030	2,375	1,034	1,118	840	689	626
Electric Autolite..	10,527	2,615	1,994	918	1,269	3,983	3,037	2,165	1,742	1,915
Electric Storage Bat.	9,734	13,224	14,983	16,190	16,362	7,217	5,841	4,331	3,297	3,158
Hayes Body.....	223	137	16	11	12	605	762	390	142	84
Houdaille Hershey.	1,997	1,586	1,927	2,038	1,793	687	405	368	237	645
Lycoming	216	144	79	134	64	666	497	297	219	136
Marlin Rockwell...	5,832	4,879	3,834	3,521	3,100	432	210	180	140	212
Midland Steel Prod.	7,363	6,837	6,096	4,907	4,600	1,010	682	495	770	863
Motor Products ..	3,048	3,276	2,950	2,060	1,399	517	391	328	329	440
Motor Wheel.....	3,960	2,547	1,996	1,537	298	994	823	534	586	663
McCord Radiator..	316	360	156	104	116	1,067	680	430	341	451
Mullins Mfg.....	441	139	427	84	149	470	701	811	214	223
Murray Corp.....	1,617	3,285	3,358	2,965	706	2,828	758	634	731	1,941
Raybestos-Manhattan	3,472	3,306	3,164	3,325	2,641	1,732	1,496	1,254	1,019	1,434
Reynolds Spring...	122	76	23	5	32	491	316	196	116	65
Ross Gear & Tool..	606	614	768	755	790	145	139	119	42	61
Spicer Mfg. Co....	704	974	693	1,122	731	1,217	952	711	293	613
Stewart-Warner ..	3,039	4,537	4,649	2,851	1,274	4,082	2,373	1,733	1,168	1,298
Thompson Products	740	349	155	162	212	698	459	518	356	425
Timken Detroit Axle	3,680	3,401	3,487	3,050	2,700	1,763	1,653	1,922	1,255	1,083
Timken Roller Bear.	13,615	14,547	14,037	13,556	14,210	1,963	1,376	1,087	551	1,545
Trico Products....	1,620	2,940	3,459	3,700	4,421	691	516	519	389	414
L. A. Young.....	2,182	1,545	1,378	939	394	1,074	576	590	472	700
Totals	$102,452	$105,056	$94,019	$87,203	$81,551	$57,211	$40,202	$31,803	$23,363	$31,438

	Inventories (000 Omitted)					Current Assets (000 Omitted)				
	1929	1930	1931	1932	1933	1929	1930	1931	1932	1933
American Chain...	$7,596	$7,778	$6,418	$4,646	$4,401	$14,427	$13,740	$10,173	$7,950	$8,121
Bendix Aviation...	5,239	4,754	3,993	3,066	4,020	25,573	12,883	9,803	7,947	10,541
Bohn Aluminum...	2,212	3,467	3,785	2,977	4,592	6,450	5,610	4,987	4,298	5,648
Borg-Warner	7,632	5,725	5,046	3,877	5,625	19,222	15,194	14,645	12,674	14,992
Briggs Mfg. Co....	*a9,867*	*a4,660*	*a5,232*	*a5,539*	*a6,352*	18,084	18,858	13,532	13,525	17,007
Budd Mfg. Co., E. G.	4,665	2,314	2,632	1,490	2,060	8,797	4,910	4,257	3,861	3,474
Budd Wheel.....	1,755	1,465	1,137	883	1,021	3,311	3,862	2,410	1,213	1,809
Campbell, Wyant & Cannon	817	299	296	209	454	1,870	1,483	1,281	1,122	1,351
Eaton Axle	2,298	2,650	2,451	1,797	1,961	4,544	6,029	6,180	4,516	4,962
Electric Autolite...	4,366	3,144	2,510	1,954	2,223	18,876	8,797	6,669	4,614	5,407
Electric Storage Bat.	7,576	6,589	4,692	3,492	4,031	24,567	25,696	24,068	23,111	23,691
Hayes Body.....	1,951	567	232	179	113	2,818	1,510	642	341	210
Houdaille Hershey.	1,756	798	726	723	913	4,441	2,789	3,048	3,033	3,351
Lycoming	2,118	1,582	1,541	1,566	1,406	3,033	2,336	1,918	1,920	1,606
Marlin Rockwell...	1,646	1,123	730	602	896	7,910	6,212	4,744	4,263	4,208
Midland Steel Prod.	1,132	867	809	643	1,357	9,505	8,386	7,401	6,321	6,820
Motor Products ..	1,210	851	659	524	1,202	4,775	4,518	3,938	2,913	3,041
Motor Wheel.....	2,821	1,884	1,489	1,144	2,214	7,775	5,255	4,019	3,266	3,175
McCord Radiator..	1,208	768	715	414	626	2,592	1,808	1,301	860	1,194
Mullins Mfg.....	1,750	1,136	1,269	861	460	2,661	1,975	2,507	1,159	831
Murray Corp.....	4,630	4,159	3,296	2,186	2,653	9,074	8,201	7,288	5,883	5,301
Raybestos-Manhattan	4,759	3,511	2,326	1,933	3,309	9,963	8,312	6,745	6,278	7,385
Reynolds Spring...	1,782	302	259	216	265	3,313	695	479	337	362
Ross Gear & Tool..	366	276	193	131	204	1,117	1,029	1,081	928	1,054
Spicer Mfg. Co....	4,328	2,575	1,627	610	1,089	6,249	4,501	3,031	2,025	2,433
Stewart-Warner ..	7,771	4,453	2,869	2,194	2,581	14,892	11,363	9,251	6,213	5,155
Thompson Products	1,995	1,096	765	809	876	3,433	1,904	1,437	1,327	1,513
Timken Detroit Axle	4,788	3,393	3,248	2,634	2,413	10,231	5,055	8,658	6,940	6,195
Timken Roller Bear.	10,676	8,708	6,292	4,927	7,074	26,254	24,631	21,487	19,056	22,829
Trico Products....	668	708	606	451	435	3,054	4,308	4,944	4,896	5,649
L. A. Young.....	1,204	1,023	804	771	1,552	4,550	3,232	2,786	2,196	2,650
Totals	$112,582	$82,625	$68,647	$53,448	$68,378	$283,361	$225,082	$194,710	$164,986	$181,965

31 Parts Makers Earned $7,600,000 Net in 1933

Continued from preceding page

	Current Liabilities (000 Omitted)					Working Capital (000 Omitted)				
	1929	1930	1931	1932	1933	1929	1930	1931	1932	1933
American Chain...	$1,826	$1,278	$778	$610	$648	$12,601	$12,463	$9,395	$7,340	$7,472
Bendix Aviation...	3,542	2,569	2,142	1,340	1,501	22,031	10,314	7,661	6,607	9,040
Bohn Aluminum...	1,375	581	325	223	702	5,076	5,029	4,662	4,076	4,946
Borg-Warner	4,392	2,629	2,781	1,118	1,816	14,830	12,565	11,864	11,556	13,176
Briggs Mfg. Co....	5,454	3,526	2,503	1,909	2,683	12,630	15,332	11,029	11,615	14,324
Budd Mfg. Co., E. G.	1,848	597	1,902	2,497	2,643	6,949	5,242	1,999	1,364	2,643
Budd Wheel.....	1,212	1,168	625	519	979	2,099	2,693	1,785	695	840
Campbell, Wyant & Cannon	502	208	207	136	167	1,369	1,275	1,075	986	1,184
Eaton Axle.....	1,304	1,177	900	605	680	3,240	4,852	5,279	3,911	4,283
Electric Autolite...	4,784	2,562	1,488	1,018	843	14,092	6,235	5,180	3,596	4,564
Electric Storage Bat.	2,633	1,999	1,110	822	972	21,933	23,698	22,958	22,289	22,718
Hayes Body.....	1,072	295	179	277	198	1,746	1,215	462	64	12
Hondaille Hershey.	1,001	264	413	388	569	3,439	2,525	2,635	2,610	2,781
Lycoming	1,084	1,808	350	90	188	1,948	528	1,568	1,830	1,419
Marlin Rockwell...	1,800	1,380	242	118	111	6,109	4,832	4,502	4,145	4,098
Midland Steel Prod.	1,431	900	612	239	845	8,074	7,486	6,789	6,082	5,975
Motor Products....	1,043	384	323	285	980	3,733	4,134	3,615	2,628	2,061
Motor Wheel.....	1,091	651	1,036	1,438	1,366	6,684	4,604	2,983	1,828	1,810
McCord Radiator..	560	168	277	258	384	2,032	1,640	1,025	602	810
Mullins Mfg.....	225	249	1,271	581	466	2,436	1,726	1,236	577	365
Murray Corp.....	2,271	1,148	873	581	1,225	6,803	7,054	6,415	5,301	4,075
Raybestos-Manhattan	1,143	533	349	313	609	8,819	7,779	6,396	5,965	6,776
Reynolds Spring...	1,191	101	235	297	223	2,123	594	245	40	139
Ross Gear & Tool..	323	188	167	46	95	793	841	914	883	959
Spicer Mfg. Co....	2,504	715	696	418	626	3,746	3,786	2,335	1,608	1,807
Stewart-Warner ..	2,773	1,471	948	783	1,404	12,119	9,892	8,303	5,430	3,751
Thompson Products	1,483	517	496	522	541	1,951	1,387	941	805	972
Timkin Detroit Axle	1,538	510	1,095	279	501	8,693	4,545	7,563	6,661	5,695
Timkin Roller Bear.	3,694	2,295	1,144	512	1,572	22,560	22,335	20,343	18,544	21,257
Trico Products....	846	806	759	615	779	2,209	3,501	4,186	4,281	4,870
L. A. Young.....	679	637	402	292	456	3,871	2,594	2,384	1,904	2,194
Totals	$56,624	$33,314	$26,628	$19,119	$26,772	$226,738	$192,696	$167,727	$145,823	$157,016

	Funded Debt (000 Omitted)					Capital and Surplus (000 Omitted)				
	1929	1930	1931	1932	1933	1929	1930	1931	1932	1933
American Chain...	$5,200	$4,522	$4,194	$3,844	$4,342	$22,468	$22,446	$18,680	$16,336	$15,763
Bendix Aviation...	101	420	611	432	302	63,513	61,787	61,590	21,666	22,965
Bohn Aluminum...	1,902	1,902	1,875	1,767	1,411	8,637	8,513	8,273	5,434	6,576
Borg-Warner	1,909	1,819	1,601	1,586	1,075	32,278	31,283	30,551	28,256	28,964
Briggs Mfg. Co....	.....	.....	.....	.....	.....	32,530	35,564	32,990	22,895	24,486
Budd Mfg. Co., E. G.	3,177*	2,794*	5,923*	2,192*	2,192*	22,343	20,761	19,488	13,456	12,571
Budd Wheel.....	.....	.....	.....	.....	.....	6,774	7,644	6,877	5,138	3,647
Campbell, Wyant & Cannon	.....	.....	.....	.....	.....	5,556	5,553	5,399	5,085	5,126
Eaton Axle.....	750	750	750	.....	.....	11,085	13,999	11,864	11,169	11,422
Electric Autolite...	.....	.....	.....	.....	.....	26,021	22,230	21,045	14,708	14,660
Electric Storage Bat.	.....	.....	.....	.....	.....	37,013	38,168	36,519	35,355	35,400
Hayes Body.....	.....	.....	.....	.....	.....	5,532	4,560	3,680	2,734	2,185
Hondaille Hershey.	.....	.....	.....	.....	.....	8,974	7,957	10,236	9,381	9,272
Lycoming	512	397	359	131	98	4,200	3,492	4,458	3,899	3,194
Marlin Rockwell...	.....	.....	.....	.....	.....	8,943	7,921	7,209	6,735	6,609
Midland Steel Prod.	.....	.....	.....	.....	.....	15,238	14,896	14,075	13,494	13,502
Motor Products....	.....	.....	.....	.....	.....	7,996	8,141	7,605	6,343	5,754
Motor Wheel.....	.....	.....	.....	.....	.....	14,932	13,502	11,028	9,036	8,557
McCord Radiator..	2,395	2,243	2,039	2,005	1,971	4,317	2,932	2,576	2,182	2,020
Mullins Mfg.....	.....	.....	.....	.....	.....	7,353	6,499	6,443	4,004	2,258
Murray Corp.....	3,185	2,860	2,500	2,250	2,000	24,864	24,458	23,633	12,674	11,954
Raybestos-Manhattan	.....	.....	.....	.....	.....	17,879	17,293	15,876	14,966	15,294
Reynolds Spring...	1,331	450	450	450	446	5,662	1,949	1,648	1,455	1,497
Ross Gear & Tool..	.....	.....	.....	.....	.....	2,463	2,435	2,420	2,353	2,463
Spicer Mfg. Co....	.....	.....	.....	.....	.....	13,369	13,010	11,589	8,211	7,864
Stewart-Warner ..	.....	.....	.....	.....	.....	30,667	26,929	20,696	17,183	13,129
Thompson Products	.....	.....	.....	.....	.....	6,522	5,946	5,494	5,245	3,905
Timkin Detroit Axle	.....	.....	1,062	940	628	17,851	16,830	16,687	15,299	13,699
Timkin Roller Bear.	.....	.....	.....	.....	.....	46,458	46,782	43,305	39,506	40,080
Trico Products....	35	.....	.....	.....	.....	4,703	5,669	6,494	6,522	7,003
L. A. Young.....	642	415	314	223	175	8,684	8,248	7,870	7,102	7,513
	$21,139	$18,572	$21,678	$15,820	$14,640	$524,922	$507,397	$476,298	$367,822	$359,332

Piezo-Electric Indicators

The third article in a series describing progress in the development of indicators for high speed engines

by P. M. Heldt

Engineering Editor, Automotive Industries

CERTAIN crystalline substances, such as tourmaline and quartz, possess the property that when subjected to mechanical pressure in a particular direction relative to their crystal faces, an electric potential is set up in them which is directly proportional to the pressure. No appreciable current is obtainable from the crystals, but electric pressure variations thus generated can be amplified by a vacuum-tube amplifier whose output terminals are connected to the deflecting plates of a cathode-ray oscillograph. In this type of oscillograph the beam of cathode rays is deflected from its normal direction by means of electrically charged plates, in proportion to the potential difference between these plates. The beam produces a spot of light on a fluorescent screen, and variations of electric potential produced by variations of pressure in the combustion chamber and on the quartz crystals cause the spot of light to travel up and down. If in addition the beam of cathode rays is deflected horizontally in proportion to crank travel or combustion-chamber volume, the spot describes an engine diagram.

It appears that the use of an assembly as above outlined, for purposes of engine indication, was first suggested by S. Wanatabe in the Scientific Papers of the Institution of Physico-Chemical Research, in 1929. Wanatabe actually used an instrument of this type on an engine, using a cathode-ray oscillograph in connection with it. He did not obtain any scale diagrams, however, since the deflection of the beam parallel to the axis of abscissas was not proportional to time. He pointed out the possibility of producing scale diagrams by means of this type of apparatus, however.

J. Kluge and H. E. Linkh of the Physikalisch-Technische Reichsanstalt in Charlottenburg, Germany, the following year built an indicating set in which they used a piezo-electric detector in combination with an amplifier and a string galvanometer. Their instrument was described in the *Zeitschrift des Vereines Deutscher Ingenieure* for June 21, 1930. Two quartz crystals are built into a steel chamber (Fig. 1) which can be screwed into the cylinder wall. The quartz disks are so cut that the direction of pressure on them coincides with one of the electrical axes of the crystals. The steel chamber is provided with a very thin bottom which serves as an elastic intermediate member transmitting the combustion-chamber pressure to the crystals and preventing fouling, moistening of the crystals, and interference with their action by outside electric or magnetic influences. A measuring electrode is interposed between the two crystals, whose polarities are opposed, so that when pressure is applied the resulting electrical charges of the two combine.

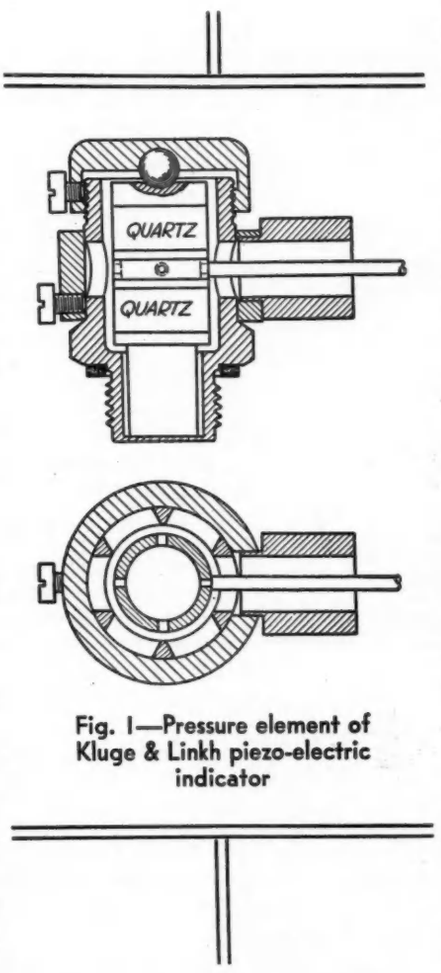


Fig. 1—Pressure element of Kluge & Linkh piezo-electric indicator

Initial pressure is applied to the quartz crystals by means of a screw cap and a steel ball. The use of two quartz disks in opposition does away with the need for insulators, which are objectionable in this place because of their heat-sensitiveness. The two outer electrodes of the quartz disks are grounded to the case. The measuring wire, which is screened against inductive influences by a metal tube, leads to the string galvanometer.

Owing to the thinness of the bottom of the pressure chamber (0.020 in. for a diameter of ⅝ in.), practically the whole gas pressure (99.8 per cent) is transmitted to the quartz crystals. While the assembly of quartz disks and electrode has a certain amount of elastic inertia, this is exceedingly small, and the natural frequency of the assembly is 100,000 cycles per second.

For recording pressure variations, use is made of a string galvanometer in conjunction with an oscillograph. The milli-ampere coil of this galvanometer has a natural frequency of 2,000 per second, which is considered to be sufficient for all requirements in engine indicators. It is stated by the sponsors of this instrument that the string galvanometer and the oscillograph are both so highly developed that they afford a simple and satisfactory means of recording variations in piezo-electric charges. They feel that the use of the cathode-ray oscillograph, which instrument is much more complicated in its operation, is justified only if the frequency of the cycles to be recorded is too high for the string galvanometer.

Another piezo-electric indicator has been developed by H. G. I. Watson and D. A. Keys of McGill University, Mon-

treal, Canada, in cooperation with the National Research Council of Canada. As shown in Fig. 2, they combine their detector with the spark plug and they use six crystals instead of two, which increases the electrical charges generated proportionally. Adjacent crystals are reversed with respect to polarity. Metal plates are inserted between adjacent crystals, and all such plates in contact with negative faces of the crystals are electrically connected to terminal K, while the plates in contact with positive faces are grounded through the hemispherical pressure plate G and the adjusting screw H. By means of the adjusting screw the initial pressure on the crystals is adjusted so that there is no electric charge on the crystals. Charges on the crystals will then vary in direct proportion to the combustion chamber pressure, the charge becoming negative for an under-pressure or vacuum in the combustion chamber. To reduce leakage, the crystal assembly is shunted with a variable mica condenser (0.001-0.006 microfarad). The small potential variations across the condenser produced by the crystal detector are amplified and applied to the deflecting plates of a cathode-ray oscillograph.

The general arrangement of this system of engine indicating is illustrated in diagrammatic form in Fig. 3. A two-stage, resistance-coupled aperiodic amplifier is used, in which the first stage is replaced by a bridge-type arrangement. This is said to have the advantage that disturbing influences due to changes in battery potential, battery-operating current, etc., are minimized. It is also possible to keep the tubes working on the straight-line portion of their characteristic.

In Fig. 3, C is the crystal detector; C_x, the small condenser shunted across it. Variations in pressure across C_x due to changes of pressure on C, cause a change of potential of G_1, the grid of tube T_1. This throws the bridge out of balance, with the result that the potential of G_3 is altered and the potential across resistance R_3 is changed. By operating the tubes on the appropriate parts of their characteristics, a constant amplification factor is obtained for the whole range of potential corresponding to the pressure range in the combustion chamber.

One pair of deflection plates in the oscillograph are connected across the resistance R_3, a number of the cells of the B battery B_3 being included so as to keep the light spot on the fluorescent screen. The key and high-resistance galvanometer serve to check the balance of the bridge circuit, R_1, R_2, X_1 and X_2 being changed so that small changes in plate-battery voltage and in the main battery rheostat do not change the current through the galvanometer (which need not be zero). Potentials of batteries C_1, C_2 and C_3, and the capacity of condenser C_x can be changed. R_1 and R_2 are 150,000 volts each. The battery voltage B_1B_2 is 180 volts; B_3 is also 180 volts, of which about 100 is included in the oscillograph circuit.

A J. B. Johnson cathode ray oscillograph (Western Electric Company) is used and has one pair of deflection plates connected to the amplification terminals NM, the pair which deflects the beam in the vertical plane. The second pair of deflection plates, which deflect the beam in the horizontal plane, are connected to the terminals of a timing device. The time of oscillation of the beam can be altered so that the time required for the beam to swing from one extreme horizontal position to the other is equal to the time of an engine cycle. A pressure-time diagram is then inscribed on the screen and appears stationary to the eye. By locating the oscillograph in a dark room, the light from a single transit is sufficient to leave a record on a photographic film, if the film is placed with its sensitive side directly against the glass screen of the oscillograph. For reproduction purposes "multiple-transit" diagrams are necessary.

The equipment used to give the time record is similar to that illustrated and described in the February 10 issue of *Automotive Industries* and there referred to as a "relaxation oscillator." Its use is based on the assumption that that portion of the voltage-time curve of a condenser subjected to a constant charging voltage applied through a resistance, which is made use of in the operation of the instrument, is a

(*Turn to page 660 please*)

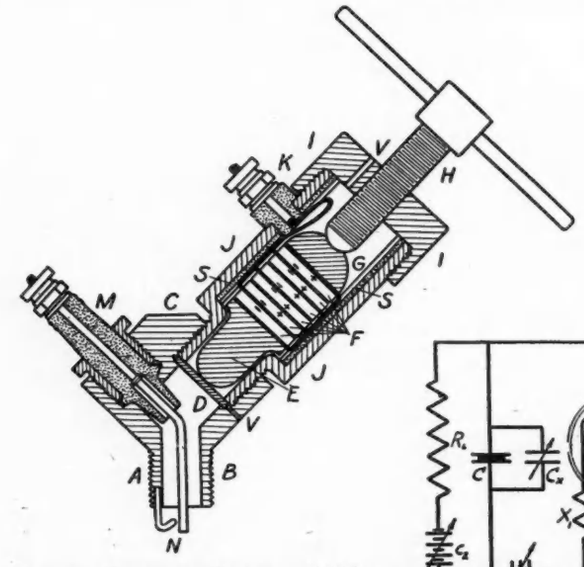


Fig. 2—Pressure element of Watson & Keys piezo-electric indicator

A, B, threaded portion of adapter screwing into spark-plug hole; C, boss on adapter, drilled and tapped to receive pressure element; D, pressure plate; E, steel block with hemispherical end transferring gas pressure to quartz disks F; G, metal hemisphere transmitting pressure of adjusting screw H to quartz disks; I, cap for steel tube J containing the quartz disks; K, binding posts; M, spark-plug insulator; N, spark points; S, S, Bakelite tube; V, V, vents.

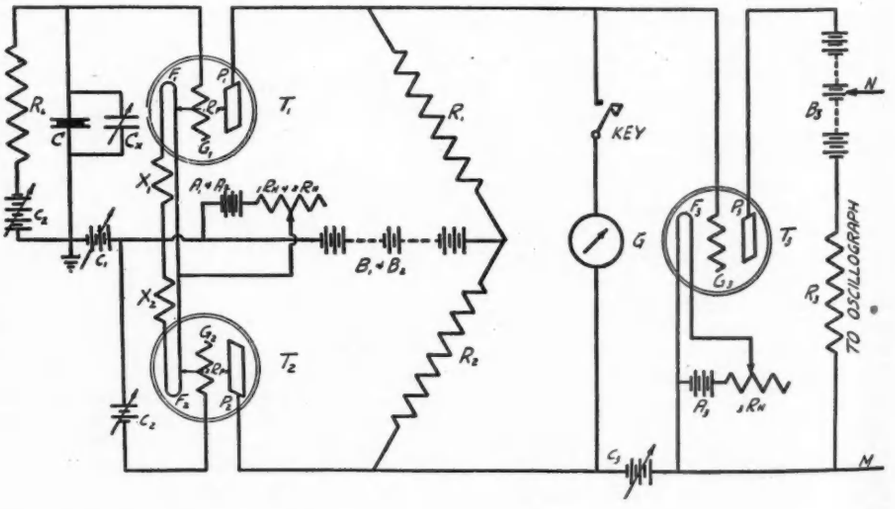
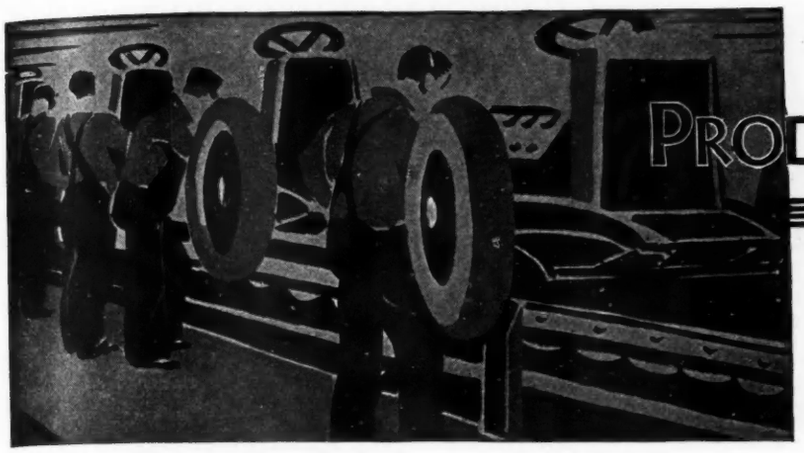


Fig. 3 — Amplifier circuit of Watson & Keys indicator



PRODUCTION LINES

Net Worth

New deal tide has washed in the capital and excess profits provisions originally written into the N.I.R.A. and rescinded when prohibition bit the dust. Now the special levies on corporation returns are a law of the land. We did some sleuthing on the problem about a year ago and dug out some rather disturbing facts. Suggest that you look them up in "New Capital and Excess Profits Taxes Call for Re-Appraisal of Net Worth" in *Automotive Industries*, Aug. 12, 1933. You'll find much food for thought.

Mileage Metered

Coincident with the industry's drive for motor lubricants of lighter viscosity as well as the recommendation of light oils for winter operation comes an *S.E.P.* series on the use of mileage metered oils. The argument is that as the speedometer mileage mounts, parts wear in proportion and heavier grades are essential for safety. The maker of the oil will have four grades, each one corresponding to the number of figures on the speedometer. Thus, No. 3 is to be used up to 999 miles, etc. How will the public reconcile this with the educational drive started last winter?

Bi-Metal

In recent correspondence we learn that British practice on inserted valve seats shows a strong tendency to bi-metal construction featuring a steel body faced with Stellite. This applies to aircraft as well as heavy-duty truck engines. Two forms of insert are favored—one is the familiar threaded ring; the other, a steel ring retained by a patented locking ring. More details will be found in our comprehensive survey.

By Belt

Engineering data and applications of belt conveyor idlers are given in a new bulletin now being distributed by The C. O. Bartlett & Snow. Of particular interest to foundry executives. Brief tables give recommendations as to spacing, capacity, angle of incline, etc. If you can use it ask for Bulletin 72.

Samples

To interest jobbers in its line of replacement fenders, Fostoria recently used the bright idea of sending samples. Each jobber received a "miniature shipment" consisting of two small scale fenders, faithful reproductions of the regular line and finished in shiny enamel. Needless to say the idea made a hit.

Big Manual

Chevrolet went the full distance with its 1934 repair manual. It's a book of 165 pages profusely illustrated and replete with practical shop information for the service man. An outstanding feature of each section of the book is the tabular data giving complete specifications and recommended fits and clearances. Should score a big hit in the field.

Vice Versa

On occasion we have remarked on the possibility of building heavy-duty engines readily interchangeable for diesel and gasoline fuels. No doubt there are some who have not taken kindly to the idea. But we went through a small diesel plant the other day where this very thing is being done. In fact the degree of interchangeability is amazing. The chief change is the use of a different set of pistons, and of course a change in the ignition system which, however, is all external.

How Much?

How much is too much or too little? This was the question posed by a prominent diesel designer recently. How much should a high-speed diesel weigh? He thinks it depends largely upon what you expect to get out of it. Thus, while diesels have been built down to 7 lb. per bhp., many engineers are convinced that there is a law limit somewhere around 12 lb.

Fifty Reports

A book on Mechanical Power Drives developed from fifty reports on very phase of industrial motor drives has been written by Robert W. Drake. Here is a text that will prove of great value to plant engineers, maintenance men and others. American Leather Belting Assn. has published the book in the interest of all belt users and is making a small charge of 25 cents per copy while the first edition lasts.

Low Weight

Had a look at a new light weight diesel the other day. It's American made and intended specifically for motor train service. At 820 rpm. this engine delivers 680 hp. Weight is down to 12 lb. per bhp. by dint of using heat treated strong aluminum alloys for the base and block eastings. Incidentally, this job will be announced in about 60 days.

Always Alert

No better evidence is needed of the progressiveness of automotive executives than their interest in certain of the new things culled in these columns. The response has been more than gratifying. Certainly tells us just what you want and we intend to give it to you. Suggestions are always in order. Please!—J. G.

MANUFACTURING MANAGEMENT METALLURGY

S.A.E. Summer Meeting at Saranac Lake

SUNDAY, JUNE 17

8:15 P. M. Business Session
President D. G. ROOS in the Chair
8:30 P. M. General Session

ALEX TAUB, Chairman

Revelations in the Realm of Color—H. T. STRONG, William Wiese & Co.

MONDAY, JUNE 18

10:00 A. M. Sound Session
W. C. KEYS, Chairman

The Place of Sound Measurements in Automobile Noise Reduction—DR. E. J. ABBOTT, University of Michigan

10:00 A. M. Accident Prevention Session

F. K. GLYNN, Chairman

Accident Control in Fleet Operation—J. M. ORR, Equitable Auto Co.

2:00 P. M. Water Carnival
8:30 P. M. Truck Design

A. G. HERRESHOFF, Chairman

Lightness in Motor Trucks—A. M. WOLF, Consulting Engineer, New York, N. Y.

TUESDAY, JUNE 19

10:00 A. M. Motor Vehicle Design
L. V. NEWTON, Chairman

Vehicle Design from a Maintenance and Operating Standpoint—F. L. FAULKNER, Armour & Co.

Weight Distribution on Front and Rear Axles of Motor Trucks—E. L. TIRRELL, Utility Management Corp.

10:00 A. M. Railcars

L. R. BUCKENDALE, Chairman

Trends in the Design and Application of Motor Trains—C. O. GUERNSEY, J. G. Brill Co.

2:00 P. M. Field Day
8:30 P. M. Streamlining Session

W. T. FISHLEIGH, Chairman

Dynamics of Automobile Design—G. L. McCAIN, Chrysler Corp.

Streamlining—Up-to-date Facts and Developments—L. H. BROWN, Jaray Streamlining Corp. of America, and HERBERT CHASE, Consulting Engineering, New York, N. Y.

WEDNESDAY, JUNE 20

10:00 A. M. Diesel Design

F. M. YOUNG, Chairman

Diesel Fuels—K. E. De ROSAY, Sun Oil Co.

Effective Combustion as Determined from the Indicator Diagram—J. C. SLONNEGER, Falk Corp.

Typical Indicator Diagram Analysis with Respect to Effective Combustion—HANS FISCHER, Electric Boat Co.

Spark Ignition Injection Engines of High Output—TUNGBJOERN DILLSTROM, Hesselman Motor Corp, Sweden

10:00 A. M. Body Design

J. W. VOTYPKA, Chairman

Basic Principles of Body Design—W. D. TEAGUE, New York, N. Y.

2:00 P. M. Passenger Car Fuels and Lubricants

A. L. CLAYDEN, Chairman

Winter Oils in Automobile Engines—W. H. GRAVES, Packard Motor Car Co.; H. C. MOUGEY, General Motors Corp., and E. W. UPHAM, Chrysler Corp.

Fuel Characteristics and Vapor Lock—O. C. BRIDGEMAN, Bureau of Standards

8:30 P. M. Bearings and Lubrication

FERDINAND JEHLE, Chairman

Recent Developments in Main and Connecting Rod Bearings—S. W. SPARROW, Studebaker Corp.

Lubrication of Engines with Different Bearing Metals, with Special Reference to Copper Lead Alloys—C. M. LARSON, Sinclair Refining C.

E. P. Lubricants—Report and Demonstration—W. S. JAMES, Studebaker Corp.

THURSDAY, JUNE 21

10:00 A. M. Engine Session

K. M. WISE, Chairman

Engine Types Adapted to Automobile Design Trends—L. P. KALB, Continental Motors Corp.

The Possibilities of Forced Induction in Automotive Vehicles—LOUIS SCHWITZER, Schwitzer-Cummins Co.

10:00 A. M. Propeller Symposium

E. P. WARNER, Chairman

Controllable Pitch Propellers—F. W. CALDWELL, Hamilton Standard Propeller Co.

The Design Requirements of a Mechanical Controllable Propeller—G. T. LAMPTON, Lycoming Mfg. Co.

Controllable Pitch Propellers—Design Considerations—T. P. WRIGHT, Curtiss Aeroplane & Motor Co.

Bearings for Controllable Propellers—THOMAS BARISH, Marlin-Rockwell Corp.

2:00 P. M. Design and Combustion Studies

ROBERT INSLEY, Chairman

Observations of Flame in an Engine—C. F. MARVIN, JR., Bureau of Standards

Design Limitations of Aircraft Engines—E. S. TAYLOR, Massachusetts Institute of Technology

8:30 P. M. General Session
A. L. CLAYDEN, Chairman
LOWELL THOMAS

10:00 P. M. Grand Ball

FRIDAY, JUNE 22

10:00 A. M. Detonation Aviation Gasolines

H. K. CUMMINGS, Chairman

Correlation of Knock Ratings of Aviation Gasolines—ARTHUR NUTT, Wright Aeronautical Corp.

10:00 A. M. Shock Absorber Session

T. P. WRIGHT, Chairman

The Airplane Landing-Gear Shock-Absorbing System—C. V. JOHNSON, Bendix Products Corp.

Piezo-Electric Indicators

(*Continued from page 658*)

straight line. This does not hold absolutely, but it was found that as applied by Messrs. Watson and Keys the deviation from the straight-line relation was less than the experimental error. Incidentally it was found that the voltage-regulating effect of the neon tube of the "oscillator", a Radiotron UX 874, was much improved by illuminating it by a 40-watt lamp, which is thought to be due to a photo-electric effect.

Calibration of the pressure scale was effected by subjecting the crystal detector to hydraulic pressure, indicated by a gage, in a special fixture, and measuring the movement of the spot of light on the screen for any given pressure.

Messrs. Watson and Keys show two of the diagrams taken with this instrument in their report (A Piezo-electric Method of Measuring the Pressure Variations in Internal-Combustion Engines, National Research Council of Canada, Toronto). These are lacking in sharpness, which defect seems to be recognized by the investigators, for they mention in the concluding paragraph that the new Von Ardenne cathode-ray oscillograph, owing to the greater intensity of its beam, would give single-transit records that could be readily photographed. The two curves shown in the report were taken on the same engine and under the same operating conditions, the difference between them being that the condenser across the crystal detector in one case had a capacity of 0.003 and in the other of 0.004 microfarad. The difference between the diagrams is that the maximum amplitude of the pressure curve is much greater in the case with 0.003 than in that with 0.004 microfarad, which shows that the scale of the diagram obtained can be changed in a simple manner by merely changing the capacity of this condenser.

Statement of Automobile Labor Board on Lay-Off and Rehiring

IN the last few weeks several substantial lay-offs of workers have taken place in various plants of the industry. From information which the Board has received, it appears probable that further substantial lay-offs are likely to occur shortly. In view of problems that have arisen already in recent lay-offs, and of the probability that similar problems will arise in one form or another in the near future, the Board believes it necessary to clarify the procedure and administration of lay-offs in the industry.

The general principles under which lay-offs are to be made are stated as follows in the President's settlement of March 25, 1934:

"The industry understands that in reduction or increases of force, such human relationships as married men with families shall come first and then seniority, individual skill and efficient service."

While these principles are clear, many detailed questions, some of which could not have been foreseen, already have been raised. In order to avoid confusion in applying the President's principles, the Board announces the following rules for the industry to follow in reducing and increasing forces:

1. When there is a decrease of force, the following procedure shall be observed:

(a) Employees hired after September 1, 1933, shall be the first to be laid off, irrespective of marriage or dependency, unless they fall within class (d) mentioned below.

(b) Employees next to be laid off shall be those hired before September 1, 1933, who are unmarried and without dependents, except in the cases of employees of long service, and of employees in class (d) mentioned below.

(c) Employees next to be laid off shall be those hired before September 1, 1933, who are married and those who have dependents.

In each of classes (b) and (c) employees of less service shall be laid off before employees of longer service; service to be determined on a yearly basis.

(d) Employees whose work in the judgment of the management is essential to the operation of the plant and production, or who have received special training or have exceptional ability, may be hired, retained or returned to work notwithstanding the provisions of clauses (a), (b) and (c), and of paragraph 2 below.

2. When there is an increase of force, members of class (c) shall be returned to work before members of class (b), except in case of members of class (b) of long service, and members of class (b) shall be returned to work before new people are hired. In each class employees of longer service shall be returned before employees of less service. The terms of clause (d) above are intended, among other things, to provide for the establishment of the line as operations begin.

3. Length of service shall be determined as from the date of employment in the plant, or similar plants of the same employer, rather than by length of employment in the group, department, or on any job.

4. Where other things above set out are equal, the skill and efficiency of the individual employee as determined in the judgment of the management shall determine preference both in being kept at work and in being returned to work.

5. The principles above set out shall be applied with due consideration of the differences in classifications of work in various groups of operations performed in a plant.

6. All cases of discharge or quitting, as distinguished from lay-off, shall be indicated clearly as such and the reason given.

7. The task of applying this procedure in carrying out the principles of the President's Settlement involves the use of considerable data. Each of the employers in the industry will therefore prepare, previous to lay-off, schedules of lay-off, by department, group or job affected, indicating in detail the employees retained, together with list of cases falling within class (d), and those to be laid off, and the pertinent records of both groups of employees. Any schedule shall be made available to the Board promptly upon its request, for use in the work of the Board. The Board will return to the employer any schedule after the occasion for the Board's use if it has passed.

8. The Board will establish such further rules as experience shall prove to be necessary.

LEO WOLMAN,
Chairman,
NICHOLAS KELLEY,
RICHARD E. BYRD.

Dated, Detroit, Mich.,
May 18, 1934.

A. F. of L. statement endorsing the Automotive Labor Board rules governing lay-off and re-hiring of men

The statement of the Automobile Labor Board represents a most important advance in the human relations of the automobile industry. The great fluctuations of employment have resulted in an insecurity for every worker. The first important step in meeting this problem of insecurity is the protection of the status of the worker. This protection will be worked out as the board proceeds under its announced policy, for lay-offs are to be governed by specific principles.

Even more important is the guarantee that workers whose service has been satisfactory and who have been employed since before last September will be put back to work before new men are hired.

This protection has been one of the main elements in the program of the A. F. of L. for the automobile workers. Beyond this we must strive in cooperation with the managements for a greater stability of employment.

Every community that has had to meet the problem of the unemployment period of the automobile industry will appreciate this effort of the Automobile Labor Board, managements and unions to alleviate the suffering that has resulted from the seasonal lay-offs.

(Signed) WILLIAM COLLINS.

High Gravity Fuel Increases Mileage

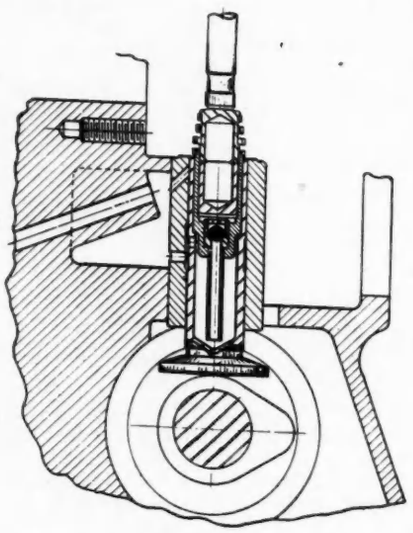
CONCERNING the special fuel which is to be used by some of the competitors in the Indianapolis race, we are informed by the Standard Oil Company of New Jersey, who developed the fuel, that tests conducted on the Speedway by Bill Cummins showed that 45 gal. of this fuel will give the same mileage as 51 gal. of the regular racing mixture. The new fuel has an octane number of better than 96 and an A.P.I. gravity of 41.9 (specific gravity, 0.817). The great weight of the fuel accounts for its great heat content, which in turn is responsible for the low consumption. The advantage of this fuel is its ability to provide requisite acceleration, warming-up characteristics and power, in spite of its high specific gravity.

While no information has as yet been released on the composition of the fuel by the producer, it is understood that it is a blend of hydrogenated safety gasoline (which has a low-slope distillation curve starting at about 300 deg. F.), with sufficient high-volatility gasoline to give the required accelerating and warming-up characteristics.

NEW DEVELOPMENTS
Automotive Parts, Accessories and Production Tools

Hydraulic Tappet Adjuster

Hydraulic automatic tappet adjusters, as first used on Pierce Arrow cars two years ago, have now been introduced on the market under the trade name Valve-A-Matic hydraulic lifters by the Wilcox-Rich Co., Detroit, after further development reducing their cost of production.



Sectional view of Valve-A-Matic hydraulic lifter

As now made (see sectional view) the adjusting means is a separate hydraulic unit which is set into the lifter body when assembling. This makes it possible for the hydraulic unit to be identical in all applications, with variations in the body only. The lifter body is of substantially the same construction as the present conventional tappet, hence only the hydraulic unit needs to be described.

Oil under pressure is delivered from the main oil supply to a point high in the reservoir. The oil fed into the lifter is taken from a point near the bottom of the cavity. A hole connecting the top of the cavity with the clearance space between the guide bore and the lifter body provides a continuous but restricted flow of oil which serves to bleed out the lighter, aerated oil, so that the oil taken from the bottom of the cavity is substantially free from air. This oil is forced under the normal engine pressure into the annular groove around the body, through the hole into the cavity below the hydraulic unit. The tube extending downward from the unit insures that practically all the oil in this cavity forms a reserve supply for starting and assists somewhat in the separation of air. Oil from this cavity passes through the check valve into the adjusting chamber below the end of the plunger.

A light spring holds the plunger against the valve stem and the face of the lifter in constant contact with the cam. The bottom end of the plunger clears the bottom of the bore by about 1/16 in. In this manner, after air is worked out at the time of installation, the lifter is always filled with oil and the clearance is entirely taken up by the oil column below the plunger. Although the lifter leaks down this 1/16 in. when the engine is stopped with the valve in the open position, there is said to be never any perceptible noise in starting.

Designed for Tractor Use

Two new spark plugs specially designed to meet the requirements of tractor service have been announced by the A. C. Spark Plug Company. These plugs have heavy insulators. Electrodes are of Isovolt material and in the form of specially heavy wire. There are two welded-in side wires. "Heat-sealed" construction is claimed to prevent "blow-by," and an unglazed insulator tip to resist incrustation.

"Tractor 9" plug is recommended for use in tractor engines in good operating condition and not consuming an excessive amount of oil, while "Tractor 12" is recommended for use in engines which are worn and consume an excessive amount of oil.

New AC spark plugs for tractor engines

Ground Grip Heavy Duty

A new tire for construction work and operation where extreme traction is needed has been developed by the Firestone Tire & Rubber Co., known as the Ground Grip Heavy Duty. The unusual feature is a chevron designed tread. Extra rubber is built into the side-walls to give protection against cuts. This tire operates with lower air-pressure than the old heavy duty types. The "Ground Grip" is made in sizes from 6.00-20 to 10.50-24 and is used on rims specified ranging from 5 to 10 in.

G.E. Automobile Indicator Lamp

A new 6-8 volt indicator lamp, about as large as an ordinary flash-light bulb, and designed to perform a variety of signaling services on automobiles, has been developed by the Incandescent Lamp Department of General Electric Company at Nela Park, Cleveland, Ohio. It is known as Mazda 51.

Despite its small size, the new lamp produces one candlepower of light. Like the conventional headlight bulbs, it is equipped with a miniature bayonet base.

The lamp is provided in three bulb finishes—clear, green and red. The latter finish combines red and black spray coatings, giving the lamp a mahogany color when unlighted, and brilliant but non-glaring red when lighted, so there can be no doubt on the part of the driver as to whether the lamp is lighted.

Among the many services for which the new lamp is applicable are: As a radio panel lamp for auto radios; as a hot-water heater switch indicator; as a light source for instrument illumination, where it will give more uniform distribution of light than present types provide.

"Repetitive Stresses" Cause Failure, Not Fatigue

In a recent issue of *Mining and Metallurgy*, Dr. H. W. Gillette of Battelle Memorial Institute objects rather strenuously to the use of the term "crystallization" in an article in that publication dealing with the subject of drill-steel breakage. He says the Bureau of Standards some years ago issued a letter circular, "Metals Do Not Crystallize Under Repeated Stress," and the A.S.T.M. Fatigue Research Committee is especially anxious to see this false and misleading phraseology abandoned.

The editor referred the matter to Prof. H. F. Moore of the University of Illinois, generally regarded as the leading authority in this country on the resistance of metals to repetitive stress, who replied that he wished a crusade could be started against the use of the word "fatigue" as well. "It isn't quite as bad as 'crystallization,'" he says, "but it isn't a very good description."

From the above it would appear that both "crystallization" and "fatigue" are looked upon with disfavor by authorities, and writers on the subject of failure through repetitive stress will have to be very careful in the choice of their terminology.

Altitude Tests

TESTS made on a Curtiss D-12 engine in the Altitude Laboratory at the Bureau of Standards show the following effects on engine performance of change in jacket-water outlet temperature:

1. Friction at all altitudes is a linear function of jacket-water temperature, decreasing with increasing temperature.
2. The brake horsepower below an altitude of about 9,000 feet decreases, and at higher altitudes increases, with increasing jacket-water temperature.
3. The brake specific fuel consumption tends to decrease, at all altitudes, with increasing jacket-water temperature.
4. The percentage change in brake power output is roughly equal to the algebraic sum of the percentage change in volumetric efficiency and mechanical efficiency.

The results of the investigation are given in detail in Technical Note No. 476 of the National Advisory Committee for Aeronautics, Washington, D. C.

BUNDYWELD

STEEL TUBING

has an inside surface

CLEAN, SMOOTH

Free from Scale

The reducing atmosphere employed in welding Bundyweld tubing completely deoxidizes the tube, producing a finished product with an absolutely clean, smooth scale-free, copper-coated surface both inside and out.

Bundyweld Steel Tubing is rolled from strip steel which has been previously copper-coated on two sides, and is then Copper-Hydrogen-Electric-Welded into a solid structure. This copper coating gives Bundyweld Tubing very desirable corrosion-resisting properties. Because of its ability to withstand vibration, its great strength, and recuperative properties, it has been proven superior for such installations as gas, oil, brake, and vacuum lines. It has the strength of steel with sufficient ductility to permit easy fabrication. It may be heat-treated without injury.

Both I. D. and O. D. are held to tolerances of .003". Uniformity of wall thickness is an outstanding feature. Bundyweld tubing is furnished in base sizes of $\frac{3}{16}$", $\frac{1}{4}$", $\frac{5}{16}$", $\frac{3}{8}$", $\frac{7}{16}$", $\frac{1}{2}$", and $\frac{5}{8}$" in various wall thicknesses. It can be redrawn to any odd size required. Furnished in lengths or completely fabricated, either with or without fittings. Send blue prints or samples for quotations. Complete information upon request.

BUNDY TUBING CO.

DETROIT

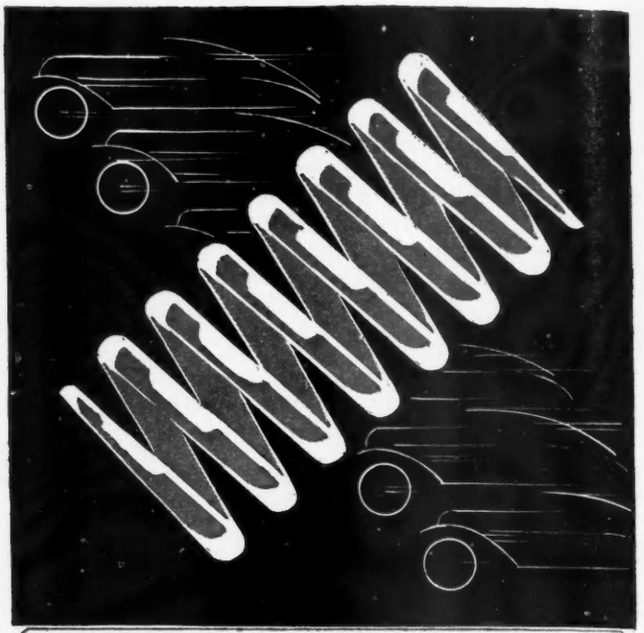
ARMOR FOR FRICTION PARTS

Colloidal graphite as manufactured by the Acheson Process from pure electric-furnace graphite is eminently suited as an adjunct lubricant for oils when running-in new engines.

Crankcase and top cylinder oils fortified with this abrasive-free graphite are given added value because of the protective graphoid surface it forms on the friction parts.

Evidence of the purity of Acheson colloidal graphite is clearly shown in the results of a test recently made on the lubrication of ball bearings with a colloidal-graphited oil. Write for Technical Bulletin No. A182 describing this test and Bulletin C92 dealing with the use of colloidal graphite in certain special-purpose lubricants.

ACHESON COLLOIDS CORPORATION
Founded (1908) as
ACHESON OILDAG COMPANY
PORT HURON, MICH.



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BUYERS' GUIDE

Automotive Products and Factory Equipment Manufactured by Advertisers in This Issue

See Alphabetical List of Advertisers on Page 44

This Advertisers' Index is published as a convenience, and not as part of the advertising contract. Every care will be taken to index correctly. No allowance will be made for errors or failure to insert.

Alloys
Non-Ferrous
Aluminum Co. of America

Axles
Bliss & Laughlin, Inc.

Bearings, Anti-Friction
Ball
Norma-Hoffmann Bearings Corp.
Roller
Hyatt Roller Bearing Co.
Norma-Hoffmann Bearings Corp.

Bending & Straightening Machines
Chambersburg Engineering Co.
National Machinery Co.

Boring Machines
Baker Bros., Inc.
Foote-Burt Co.

Brakes, Air
Bendix-Westinghouse Automotive Air Brake Co.

Broaching Machines
Foote-Burt Co.

Cable
Brake or Cutout Control
American Steel & Wire Co.
Ignition, Starting & Lighting
American Steel & Wire Co.

Castings
Aluminum
Aluminum Co. of America

Channels for Glass
Felt
American Felt Co.

Cleaners
Metal
American Chemical Paint Co. (Rust Preventive)

Compounds, Anti-Squeak, Anti-Friction
Watson Co., John Warren

Compressors, Air
Bendix-Westinghouse Automotive Air Brake Co.

Connecting Rods
Aluminum Co. of America

Controls, Clutch
Bendix-Westinghouse Automotive Air Brake Co.

Controllers, Electric Welders
General Elec. Co.

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Greenlee Brothers and Co. (Multiple Spindle)

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Forgings
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Furnaces, Electric
Annealing, Carburizing, Heat Treating, Forging & Welding
Electric Furnace Co.